Management for Professionals

Shusong Ba
Yang Wang
Haifeng Bai
Haokang Thomas Zhu

RWA Tokenisation in Web 3.0 Era

Springer

Management for Professionals

The Springer series “Management for Professionals” comprises high-level business and management books for executives, MBA students, and practice-oriented business researchers. The topics cover all themes relevant to businesses and the business ecosystem. The authors are experienced business professionals and renowned professors who combine scientific backgrounds, best practices, and entrepreneurial vision to provide powerful insights into achieving business excellence.

The Series is SCOPUS-indexed.

Shusong Ba · Yang Wang · Haifeng Bai ·
Haokang Thomas Zhu

RWA Tokenisation in Web 3.0 Era

Springer

Shusong Ba
HKU Business School
Hong Kong, China

Peking University
Beijing, China

Haifeng Bai
CMB International Asset Management Limited
Hong Kong, China

Yang Wang
Hong Kong University of Science and Technology
Hong Kong, China

Haokang Thomas Zhu
China Asset Management (Hong Kong) Limited
Hong Kong, China

ISSN 2192-8096 ISSN 2192-810X (electronic)
Management for Professionals
ISBN 978-981-96-7662-0 ISBN 978-981-96-7663-7 (eBook)
https://doi.org/10.1007/978-981-96-7663-7

This Springer imprint is published by the registered company Springer Nature Singapore Pte Ltd.
The registered company address is: 152 Beach Road, #21-01/04 Gateway East, Singapore 189721, Singapore

Preface I

The Financial Industry Is Confronting a Major Digital Migration and Transformation: Exploring Innovative Practices in Web 3.0 and Digital Virtual Assets in Hong Kong

At present, short-term market turmoil and changes in the international economic and trade pattern make it easy for the financial community to ignore the emerging deep, fundamental, and trending innovations and changes. In fact, in today's global economy, digitalization and Technological innovation has become a key factor in promoting economic development. Especially in the field of Web 3.0 and digital virtual assets, these technologies are redefining the operation of the capital market, bringing unprecedented possibilities and new challenges to the traditional financial service industry. It is against the background of this major change in the economic and financial landscape that the government of the Hong Kong Special Administrative Region of China has successively launched a series of forward-looking economic and financial policies to support the development of Web 3.0 and digital virtual assets, which established Hong Kong's strategic vision to seize the opportunities presented by the major changes and develop into a global financial technology hub. Based on this trend and combined with the specific practice of the Hong Kong Special Administrative Region, RWA, and Tokenization provides readers with an analytical perspective on how to promote financial innovation and transformation under the existing policy framework.

This book not only interprets the basic concepts and technical characteristics of Web 3.0 in detail but also shows how these theories are applied in practice through a large number of practical cases. The content of this book covers topics from the basic theory of Web 3.0 to the application of blockchain technology and artificial intelligence big data, to the practical cases of token economics, as well as stablecoins and real-world asset (RWA) Tokenization models.

At the same time, the cases and practices contained in this book focus on the background of Hong Kong's policies. Hong Kong has always been a "super contact" connecting East and West. With the rise of the digital economy, the Hong Kong Special Administrative Region government has launched a series of incentives, including tax incentives, optimization of regulatory frameworks, and

investment in innovative technologies, in order to promote the development of Web 3.0 technology and digital virtual assets. The book introduces how Hong Kong can promote compliance with digital assets through these policies and improve the transparency and efficiency of financial markets.

As an innovative financial operation model, Tokenization can solve many limitations and problems in the traditional investment and financing model from a technical point of view. Through case analysis and theoretical discussion, the author shows how tokenization can promote the effective flow of capital, improve market transparency, and provide new investment opportunities for investors. Tokenization refers to the conversion of assets (such as equity, debt, real estate, etc.) into digital tokens, which are recorded and traded on the blockchain. This process not only improves transaction efficiency but also reduces transaction costs and participation thresholds. Through specific cases of Hong Kong, many chapters of this book show how tokenization is actually applied to various asset classes and explore how these technologies can help Hong Kong maintain its status as a global financial center.

While promoting the innovation of financial technology, how to effectively manage the accompanying risks is a major challenge that policymakers and industry participants must face. By summarizing Hong Kong's experience, this book explores how regulators can ensure the stability and security of the market by formulating reasonable policies and regulatory frameworks in the rapidly developing digital asset market. The book gives examples of how Hong Kong's financial regulators classify and manage stablecoins and other cryptocurrencies and formulate a series of regulatory measures, including capital requirements, liquidity management, and anti-money laundering and counter-terrorism financing policies, to ensure that these emerging products will not have a negative impact on the broader financial system.

In addition to Hong Kong's practice, this book also refers to the experience of many countries and regions around the world in the same field. It regulates the current global development trend of Web 3.0 and digital virtual assets and also shows innovative cases in different regulatory environments.

In short, RWA and Tokenization reveal the potential of digital assets and Web 3.0 technology to readers. More importantly, it also explores and provides a blueprint for how to innovate and practice under the existing policy and regulatory framework. Through rich case analysis and in-depth theoretical discussion, this book provides valuable references for scholars, policymakers, entrepreneurs, and investors in the field of financial technology. The case of Hong Kong, China,

provides valuable experience and inspiration for other parts of the world, which is worthy of reference for readers interested in this topic.

Hong Kong, China
August 2024

Shusong Ba
Executive Dean of the HSBC Financial Research Institute, Vice President of the China Macroeconomics Association, Chief Economist of the China Banking Association, Expert Member of the Chief Executive's Policy Unit Expert Group, Hong Kong Special Administrative Region Government

Preface II

Embracing Web 3.0: Opening a New Era of Tokenization

In this era of rapid transformation, the continuous development and innovation of internet technologies have led to the rise of Web 3.0, the next generation of the internet. It has had a profound impact on various aspects of society. Particularly in the field of finance and investment, the core technologies of Web 3.0—blockchain and tokenization—are reshaping investment and financing models, bringing unprecedented changes to the industry.

In the Web 3.0 era, the tokenization of RWA is a quiet but rapidly evolving financial revolution. Its core concept is "Web 3.0 empowers the real economy." The development of Web 3.0's technical and financial infrastructure provides new solutions for improving the liquidity of global RWAs, enhancing transaction efficiency, reducing transaction costs, and optimizing the inclusiveness of financial services. Based on blockchain networks and smart contract technology, various RWAs such as bonds, stocks, currencies, funds, trusts, real estate, artworks, carbon credits, etc., are transformed into digital tokens that are easy to divide, quickly transfer, and can be traded globally in real-time at a low cost 24 hours a day, 7 days a week. This not only enables these assets to be traded and managed more efficiently, conveniently, and with a lower threshold but also allows them to better integrate into the digital economy ecosystem.

Although the concept of tokenization has been discussed in the technical field for many years, it has only truly entered the public eye recently with the maturity and popularization of blockchain technology. The core of tokenization lies in using the decentralized and non-tamperable characteristics of blockchain to issue tokens to represent certain assets or rights, realizing the circulation and exchange of value. Although tokenization brings many benefits, it also requires strong technical support and a high degree of security. The core features of blockchain technology—distributed ledgers, cryptographic security, and smart contracts—are the foundation for realizing tokenization. Distributed ledgers ensure the non-comparability and transparency of data; cryptographic technology protects users' privacy and transaction security; smart contracts automatically execute contract terms, reducing human intervention and errors. However, the complexity

and novelty of the technology also bring challenges. For example, vulnerabilities in smart contracts may be exploited by hackers, resulting in financial losses; the scalability problem of blockchain networks may also lead to issues in transaction speed and cost. Therefore, continuous technical innovation and strict security measures are the keys to the success of Tokenization. In addition, tokenization also faces complex legal and regulatory issues globally. Different countries and regions have different attitudes and relevant regulations towards tokenization, which brings uncertainty to the promotion and application of tokenization and also poses legal risks to investors and participants.

RWA and Tokenization was born in such a transformative context. As scholars and practitioners who started researching Web 3.0 and Tokenization technology relatively early in China, we, with enthusiasm and a sense of mission for this field, decided to write this book to share our years of research results and practical experience with readers. We hope to deeply analyze the principles of Web 3.0 and Tokenization technology, combined with numerous cases, to clarify their applications in investment and financing and look ahead to future development trends, providing readers with a comprehensive and systematic understanding and helping them grasp the huge opportunities brought by Tokenization.

This book strives to comprehensively explain Web 3.0 and Tokenization technology from theory to practice, from concepts to cases, and from opportunities to challenges. Chapter 1 systematically introduces the definition, characteristics, and impacts on traditional investment and financing models of Web 3.0, helping readers quickly establish a basic understanding of Web 3.0. Chapters 2–4, as the theoretical cornerstone, deeply explore the blockchain technology principles on which Tokenization is based and the token economics theory contained therein, helping readers lay a solid knowledge foundation. At the practical level, Chaps. 5 and 6, as typical applications, focus on analyzing the two most core models in Tokenization—various types of RWAs and stablecoins. The RWA model innovatively proposes ways to digitize and tokenize RWAs, greatly broadening the application scenarios and boundaries of Tokenization. And stablecoins, as the bridge connecting the digital world and the real world, play a key role in promoting the prosperity of the Tokenization ecosystem. Through detailed cases and in-depth analysis, readers can clearly understand the operation mode and realization path of Tokenization.

However, the development of Tokenization is not smooth. It also faces many risks and challenges. Chapters 7 and 8, with a prudent attitude, discuss the potential problems of Tokenization in terms of supervision and social impacts, objectively analyze the resistance and limitations it faces, and propose coping strategies and development suggestions. Only in this way can the development of Tokenization be healthier and more sustainable.

We always uphold an open, innovative, and inclusive attitude and humbly accept the valuable insights of industry experts and scholars. We have specially invited many well-known domestic and foreign experts to write prefaces and recommendations for this book. From the academic and practical perspectives, they have highly evaluated the value of this book. Their participation undoubtedly adds important

academic weight to this book and enhances its practical height. During the writing of this book, we received the help of many people. We especially thank our families, teachers, and friends for their support and encouragement during the writing process. Mr. Peng Liu, Dr. Wenzhou Yi, Dr. Wenzhi Ding, and Dr. Yuxiang Li participated in the writing. The editors of Cheers Publishing have made great efforts for the smooth publication of this book. Without the support and help of the above-mentioned people, this book would not have been able to come out. We express our sincere gratitude to everyone.

The wave of Web 3.0 is surging, and tokenization is evolving from a concept to a reality. As participants, contributors, and beneficiaries of this transformation, we deeply feel the mission on our shoulders and the huge opportunities ahead. We sincerely hope that this book can be a helpful assistant and guide for readers to understand tokenization and seize the opportunities of Web 3.0. We also hope that this book will not only be a carrier for the dissemination of knowledge but also a starting point for change, inspiring everyone to actively participate in this transformation and bravely become pioneers and forerunners.

Hong Kong, China
August 2024

Yang Wang
Vice President for University Advancement, Chief Scientist of the Hong Kong Web 3.0 Association

Haifeng Bai
Managing Director and Co-Head of CMB International Asset Management

Haokang Thomas Zhu
Head of Digital Asset Management and Family Wealth Management

Praise for *RWA Tokenisation in Web 3.0 Era*

"'RWA and Tokenization' provides a comprehensive analytical framework for tokenized assets. It offers foundational and essential information for understanding the complexities of this field, making it a highly valuable read."

—Hongbin Cai, *Dean of the Faculty of Business and Economics, The University of Hong Kong, Member of the Chief Executive's Policy Unit Expert Group, Hong Kong Special Administrative Region Government*

"This book expands the discussion of tokenization to the economic and social dimensions, delving into the profound impact of tokenization on economic systems. Through a unique perspective, it helps readers gain a deeper understanding of this emerging field."

—Hongping Cai, *Chairman and Founding Partner of Hand Capital, Former Chairman of Deutsche Bank Investment Banking, Asia-Pacific*

"This book provides us with a clear framework on how tokenization can bring revolutionary changes to the real economy. Through a wealth of case studies and in-depth analysis, readers are able to better understand this trend, making it highly suitable for industry professionals who wish to apply theory to practice."

—Delin Chen, *Chairman of the Board, Circle Coin Technology, Former Chief Executive, Hong Kong Monetary Authority*

"Through thorough research, this book not only elaborates on the theoretical foundations of tokenization, but more importantly, it provides practical pathways and case studies. It is highly suitable for industry professionals who wish to apply theory to practice."

—Jiaqiang Chen, *Chairman of the Board, Huili Bank, Former Secretary for Financial Services and the Treasury, Hong Kong*

"This book fully demonstrates the potential of tokenization technology and specifically explores its practical applications across various industries. For practitioners of tokenization, this is a must-read material."

—Zhongni Chen, *Member of the Legislative Council, Hong Kong*

"In the rapidly changing financial world, this book not only provides valuable insights and tools for understanding and utilizing tokenization, but also offers a precious reference for the potential evolution of investment and financing under the empowerment of technology."

—Fang Yuan, *Founding Managing Partner, Xingjie Capital, Chairman of the ESG Committee, Former President of LGT Capital, Greater China*

"This book provides an in-depth analysis of how Web 3.0 is leading the development of tokenized assets. It elaborates in detail on the technical principles and application cases of RWA tokenization, offering profound insights into the significance of financial innovation."

—Peifan Ge, *Member of the Legislative Council, Hong Kong, Vice Chairman of the Hong Kong Democratic Alliance for the Betterment and Progress of Hong Kong*

"Tokenization is becoming a new trend in the digital asset market. This book systematically organizes the technological foundations and application models, providing comprehensive guidance and reference for financial institutions in their digital asset strategies."

—Wei Guo, *Chairman of the Board, Digital China Holdings Limited*

"This book, through a wealth of data and case studies, showcases the immense potential of tokenization. Readers will gain a sense of the urgency and significance of this technology's future development."

—Xu Jin, *Chairman, Wealth and Asset Management, Manulife Investment, Greater China, Chairman, Manulife Funds*

"This book provides a timely dissemination of RWA knowledge. The practice of RWA is yet another example of the beneficial combination of centralized trust and digital technology, which broadens financing channels."

—Mei Luo, *Director, Digital Financial Asset Research Center, School of Economics and Management, Tsinghua University*

"This book, with a wealth of practical examples, vividly illustrates the operating mechanisms and real-world value of the tokenization model. Both academic researchers and practitioners in the field can draw inspiration from it."

—Yuan Qi, *Dean, Institute for Artificial Intelligence Innovation and Industry, Fudan University, Former Vice President, Alibaba (China) Ltd., Former Executive Dean, Alibaba Data Science and Technology Institute, Former Chief AI Scientist and Chairman of the Data Intelligence Committee, Ant Group*

"*'RWA and Tokenization'* provides an authoritative analytical framework for tokenized assets. It offers an important reference for understanding the complexities of this field, making it an exceptionally valuable read."

—Dagen Qiu, *Member of the Legislative Council, Hong Kong*

"This book explains the complex concepts of tokenization in a clear and accessible manner. It is not only suitable for professionals but also for general readers interested in financial technology."

—Hailong Shang, *Member of the Legislative Council, Hong Kong*

"This book not only contributes significantly to popularizing Web 3.0 knowledge in Hong Kong, but also plays a positive role in helping Hong Kong embrace the era of tokenization and in the development of its position as an international financial center."

—Jianguang Shen, *Chief Economist, JD Group*

"This book provides us with a clear framework on how tokenization can bring revolutionary changes to the real economy. Through a wealth of case studies and in-depth analysis, readers are able to better understand this trend."

—Guangshao Tu, *Chairman, Shanghai Institute of New Finance, Former Vice Chairman, China Securities Regulatory Commission, Former Standing Committee Member of the Shanghai Municipal Party Committee and Executive Vice Mayor of Shanghai, Former General Manager, China Investment Corporation*

"This book provides us with the logical and theoretical framework on how tokenization can support the real economy. It serves as both a foundational read and a guide. Through the examination of cases and in-depth analysis, readers will gain a better understanding of the theory and practice of tokenization and RWA. Additionally, this book is beneficial for the expansion and penetration of digital asset tokenization, as well as its positive practices and implementation in society."

—Zhongmin Wang, *Chairman, Shenzhen Institute for Financial Stability and Development, Former Vice Chairman, National Social Security Fund Council*

"*'RWA and Tokenization'* provides a cutting-edge analytical framework for asset tokenization, deeply revealing the complexities of this field and laying the foundation for its further development. This is a work of significant reference value."

—Xiangdong Wei, *Associate Director, PhD Program in Financial Technology, School of Business, The Hong Kong Polytechnic University*

"Why has innovation been successful in China? Because of China's large economic scale, the cost of trial and error is relatively low, and once successful, the

overall economic impact of innovation is significant. As a professional accountant, I support the construction of innovative systems. When the productivity of an innovation-driven economy is formed, the marginal cost of utilizing that productivity is very low. This is not only a characteristic of the digital economy but also a concrete manifestation of new types of productivity.

"*RWA and Tokenization*" makes a professional effort in how digital assets and the digital economy can bring innovation and change to society. It extends the discussion of tokenization to the economic and social dimensions and delves into the profound impact of tokenization on the economic system. From the unique perspective of tokenization, this book helps readers better understand this emerging field. I sincerely recommend everyone to read this book."

—Weijun Wu, *Vice Chairman, Deloitte China*

"This book helps readers deeply understand the operation principle of Tokenization technology through a comprehensive analysis. At the same time, its cautious attitude towards potential risks also increases the credibility of this book."

—Lina Xu, *Professor and Chair of the Actuarial Department, Columbia University*

"Tokenization is becoming a new trend in the evolution of digital finance. This book provides us with a clear framework and a wealth of case studies for understanding and utilizing tokenization. It is an essential reference book for practitioners on the eve of rapid changes in the financial markets."

—Xiaofeng Zhong, *Chairman, Greater China, Groupama Asset Management*

Test yourself. How can Tokenization transform the financial world?

- Tokenization is regarded as a limited implementation of RWA. Is this statement correct? (Multiple choice)
  - A. true
  - B. False
- The main sectors for future tokenized investment and financing will primarily revolve around standardization, transparency ( ), and creative applications. (multiple choice)
  - A. Profitability
  - B. Safety
  - C. Low risky
  - D. Participation
- The Hong Kong Monetary Authority held the ( ) Project Sandbox launch ceremony in 2024.8.28. This marks an important step in the practical application of Tokenization technology in the financial industry. (multiple choice)
  - A. Ensemble
  - B. Ubin
  - C. Ethena
  - D. Ondo finance

Scan the code to join the bookshelf and claim your reading rewards.

Scan the code to access all test questions and answers, and explore the financial world of RWA and tokenization together.

Scan the QR code on the left to view more test questions from this book.

Contents

Web3.0: The Third Generation of the Internet

1

1.1 Web 3.0: The New Internet Economy with Ownership

As an emerging internet technology, Web 3.0 is built on blockchain technology and aims to create a more open and decentralized network environment. This new generation of internet technology enables users to be not only content consumers but also content creators and owners. In Web 3.0, users directly control their personal data and assets through blockchain technology, which is in sharp contrast to the current Web 2.0, where data and user interactions are mainly controlled by centralized service providers. In the development history of the internet, Web 3.0, like a rising star, is gradually reshaping our understanding and imagination of the digital world.

The term "Web 3.0" was first proposed by Gavin Wood, a co-founder of Ethereum, in 2014. It opened a new era of internet development and indicated a new direction of social development. As shown in Table 1.1, in the Web 1.0 era, network activities were limited to the display of static web pages; in the Web 2.0 era, we witnessed the rise of centralized platforms of technology giants such as Google, Meta, and Amazon; the Web 3.0 era, however, proposes a completely different vision-breaking this centralized control model. Under the framework of Web 3.0, a decentralized online ecosystem is constructed based on blockchain technology. In this ecosystem, platforms and applications are no longer controlled by a few giants but are jointly owned and maintained by all users. Users obtain corresponding ownership and control rights by participating in the development and maintenance of services.

To turn this vision into reality, Wood proposed the concept of Web 3.0 and established the Web 3.0 Foundation, which is dedicated to supporting the development of "decentralized" technology projects. The company Parity Technologies, led by him, focuses on building blockchain infrastructure for Web 3.0 (such as the Polkadot project, etc.). It provides solid technical support for decentralized applications.

S. Ba et al., *RWA Tokenisation in Web 3.0 Era*, Management for Professionals,
https://doi.org/10.1007/978-981-96-7663-7_1

Table 1.1 Comparison of the web development process

Development dimension	Web 1.0	Web 2.0	Web 3.0
Interactive mode	Clean culture	Reader-writer	Reader-writer and ownership
Creativity	Simply test	Multiple contents	Interactive economy
Economic model	Company	Platform	Network
Structural pattern	Personal computer	Cloud and mobile devices	blockchain technology
Control mode	Decentration	Centration	Decentration

In a recent interview, Wood, from the perspective of both a proponent and practitioner of Web 3.0, deeply discussed the core values and future development blueprint of Web 3.0. He firmly believes that with continuous technological advancements and the widespread expansion of its applications, Web 3.0 will become the new cornerstone of the digital world, leading human society toward a more equitable, transparent, and sustainable development path.

1.1.1 The Blueprint of Web 3.0: Constructing a Decentralized Digital Future

As a new stage in the development of the Internet, Web 3.0 is reshaping our perception and imagination of the digital world. It is built on innovative technologies such as blockchain, smart contracts, encryption technology, and decentralized storage, aiming to create a more open, transparent, secure, and autonomous new network ecosystem. The vision of Web 3.0 is not only a technological upgrade and iteration but also a transformation and reconstruction of various aspects, such as the digital economy, social governance, and cultural communication.

1.1.2 Decentralization: Reshaping the Power Structure of the Digital World

Decentralization is a core feature of Web 3.0. Through a distributed network architecture and consensus mechanism, it weakens centralized authority and empowers users with autonomy. In the Web 3.0 world, every user is an equal node. Without relying on centralized institutions or platforms, users can freely create, store, exchange, and manage their digital assets and data. This decentralized design not only improves the stability and security of the system but also provides users with more privacy protection and decision-making freedom.

Another important significance of decentralization lies in its ability to break the monopoly of data and wealth and realize the redistribution of value. In the

Web 2.0 era, a few tech giants accumulated a large amount of user data and traffic through centralized platforms, forming an oligopolistic pattern in the digital economy. However, under the Web 3.0 framework, users can directly participate in the creation and exchange of data and value through encryption technology and economic incentive mechanisms, thus obtaining a more equitable distribution of benefits. This decentralized economic model will greatly stimulate the creativity of individuals and communities and promote the prosperity and development of the digital economy.

1.1.3 Smart Contracts: Encoding Trust and Reconstructing Business Logic

Smart contracts are a key technology in Web 3.0. By converting contract terms into self-executing code, they reconstruct and optimize traditional business logic. Smart contracts run on the blockchain. Once reached and deployed, they cannot be tampered with or revoked, thus providing a new trust mechanism. This characteristic of "code is law" not only improves the efficiency and transparency of contract execution but also reduces the risks of fraud and breach of contract.

The application scenarios of smart contracts are very extensive, covering various fields such as financial services, supply chain management, intellectual property protection, and social governance. For example, in the decentralized finance (DeFi) field, smart contracts can automatically execute financial services such as lending, trading, and insurance without the participation of intermediary institutions, thus reducing costs and risks. In terms of copyright protection, smart contracts can help creators achieve automatic content authorization and charging, safeguarding the rights and interests of creators. As smart contract technology continues to mature, we will see more and more innovative applications emerging, reshaping the way our business and society operate.

1.1.4 Privacy and Security: Protecting Digital Sovereignty with Technology

In the Web 3.0 world, privacy and security are no longer luxuries but the basic rights of every user. Through encryption technology and decentralized storage, Web 3.0 provides solid protection for users' data sovereignty. Users can independently control their digital identities and data assets without worrying about privacy leakage or data abuse. At the same time, the decentralized network architecture also greatly improves the security of the system, avoiding single-point failures and external attacks.

The privacy and security protection of Web 3.0 is not only a technological advancement but also an advocacy and practice of digital rights. In the era when data has become the new "oil," how to protect personal privacy and maintain data sovereignty is a major challenge faced by the digital society. This design concept

of "privacy-centric and security-based" is bound to become an important direction for the future development of the Internet. Web 3.0 provides an innovative solution to this problem. Through technological means, it gives users control over their own data and reshapes the power structure of the digital world, mainly reflected in the following three aspects:

- In the financial field, Web 3.0 completely changes our perception of financial services through DeFi.Users can directly conduct cryptocurrency trading, lending, and other businesses on the blockchain without the need for traditional financial institutions as intermediaries. This not only improves efficiency but also significantly reduces costs.
- In the fields of art and media, the rise of non-fungible tokens (NFT) has provided a new economic model for artists and creators. Artworks and digital content can be bought and sold as NFT on the blockchain, ensuring the ownership of copyrights and the transparency of transactions. This enables creators to directly profit from their works without going through third-party platforms.
- In the field of supply chain management, blockchain technology has increased supply chain transparency, reduced fraud and errors, and improved the efficiency of the entire system.

1.1.5 Applications and Challenges: The Path to the Future

The application prospects of Web 3.0 are extremely broad, covering various fields such as finance, social networking, gaming, and art. Emerging concepts and models such as DeFi, NFT, and decentralized autonomous organizations (DAO) are reshaping the boundaries and imagination of traditional industries. More and more entrepreneurs and developers are engaging in the ecological construction of Web 3.0, exploring the infinite possibilities of the future Internet.

However, the development of Web 3.0 also faces many challenges. Firstly, there are issues regarding technological complexity and usability. For ordinary users, the barriers to blockchain and encryption technology are relatively high. Designing more user-friendly and easy-to-use interfaces and providing more human-centric interactive experiences are crucial for the large-scale popularization of Web 3.0. Secondly, there are regulatory and legal issues. The decentralized nature of Web 3.0 conflicts to a certain extent with the existing legal framework. How to establish a sound regulatory system while protecting innovation is an issue that requires continuous exploration. Finally, the decentralized network of Web 3.0 also faces new security challenges. Whether it can prevent and address risks such as smart contract vulnerabilities and 51% attacks requires the joint efforts of developers and the community. Despite these challenges, the technological innovation and value concepts represented by Web 3.0 are opening up new horizons for the digital age. As technology continues to evolve and the ecosystem matures, Web 3.0 has the potential to become the core driving force shaping the future digital economy and digital society.

1.1.6 Analysis of the Underlying Logic of Web 3.0: Reconstruction of Accounting Methods

In the long history of human civilization, written records have a history of more than 5000 years and the evolution of accounting methods has also undergone three significant changes, which have had a profound impact on the economic systems of human society. The earliest form of accounting, single-entry bookkeeping, can be traced back to 3,500 BC. Early accounts were recorded on clay tablets unearthed in the Sumerian region. This accounting method only involved records of income and expenditure. In the fourteenth century, with the rise of oceanic trade, city-states in the northern part of the Mediterranean in Italy saw the further development of accounting methods-double-entry bookkeeping emerged. The complexity of oceanic trade, including partnership operations, lending relationships, and tax handling, required accounting methods to be more detailed and comprehensive, and single-entry bookkeeping could no longer meet these needs. Further innovations in accounting methods occurred in the digital age. Since the birth of Bitcoin in 2009, distributed ledger technology (DLT) has come into being. This accounting method not only records the value of digital assets and network assets but is also a product of humanity's adaptation to digital lifestyles. The book *Being Digital* foresaw the trend of the digital migration of human society, and distributed ledger technology was born to adapt to this trend.

Accounting methods are the cornerstone of economic transactions and a key factor in the progress of social civilization. They have had a wide-ranging impact on many fields, such as the economy, society, and politics. For example, double-entry bookkeeping is regarded as the cornerstone of capitalist economic and political systems. In a distributed accounting system, accounting methods, account systems, and accounting units form three basic levels. With the advent of the Web 3.0 era, the accounting system has shifted from traditional bank accounts to encrypted accounts, and the accounting unit has changed from legal tender (hereinafter referred to as "fiat currency") to digital currency.

Against the backdrop of Web 3.0, the operation models of capital and finance have undergone significant changes. Crypto-capital plays an increasingly important role in the global financial market. From the initial coin offering (ICO) in 2017 to the currently discussed security token offering (STO), initial exchange offering (IEO), as well as the issuance of RWA and stablecoins, these are all specific manifestations of crypto-capital.

Blockchain technology, as the cornerstone of Web 3.0, has the core principle of distributed ledger technology. Compared with traditional accounting methods, blockchain technology provides a decentralized, transparent, and immutable record-keeping system. In this system, information and transactions are jointly verified by all nodes and are stored on each node through encryption, ensuring the security and integrity of data.

The innovation of Web 3.0 should start from the periphery and gradually expand to core areas to form core competitiveness. On this basis, the innovative development of Web 3.0 should evolve from digital native to digital twin, which marks the starting point of disruptive innovation. At the same time, true innovation should meet the innate needs of humanity rather than simply imitating existing products so as to better serve society. In addition, the innovation of Web 3.0 should rely on an open and transparent global ledger to build business models that match new values. Finally, with the development of Web 3.0, we need to develop user-friendly terminal tools similar to the "browser" and "graphical operating system" in the Internet era. In the future, these tools may become operating systems based on natural language to promote the popularization and application of the technology.

1.1.7 Detailed Explanation of Web 3.0 Application Innovations and Economic Models

The economic models of blockchain applications differ significantly from those of blockchain infrastructure. For example, blockchain infrastructure such as Bitcoin and Ethereum usually adopt a single-token economic model because they represent basic protocols. However, when application protocols are developed, they can design more diverse and rich economic models and tools than the basic protocols.

Economic models are mainly divided into functional tokens, security tokens, and NFT. Functional tokens represent the tokenization of usage rights, security tokens represent the tokenization of ownership rights, and NFT represent the tokenization of digital goods and digital services. Application innovations in Web 3.0 can utilize one, two, or all three of these tokens to build their economic models, thus creating more and greater innovation space than the technical protocols themselves. The integration and interoperability of Web 3.0 application innovations is an important trend for the future. The bridge between traditional finance and Crypto finance is not only a prerequisite for Web 3.0 technological innovation but also a result of its application innovation. Currently, at least five bridges are helping the traditional financial market and the Web 3.0 financial market/Crypto financial market achieve interoperability, jointly forming the overall framework for Web 3.0 application innovation in the next decade. These bridges include:

- **Crypto Asset Exchange-Traded Funds**

  This provides a way for traditional investors to invest in crypto assets.
- **Fiat—Collateralized Stablecoins**

  Regions such as Hong Kong, China, and Singapore have started to introduce compliant fiat-collateralized stablecoins, which helps stabilize the cryptocurrency market.
- **STO (Security Token Offering)**

  Compliant and legal tokenized equity provides new possibilities for connecting the traditional financial market and the crypto market.

- **RWA**

  Examples include HSBC in Hong Kong and China, tokenizing gold, and BlackRock in the United States, tokenizing US Treasury bond funds. These are instances of tokenizing physical assets and helping build a bridge between traditional finance and crypto finance.
- **Licensed Exchanges**

  Compliant and regulated exchanges are the key to the interoperability between traditional finance and the crypto market. They not only provide investment and trading services for crypto assets but also offer fiat-to-digital-currency exchange services. For example, on platforms like Coinbase, a large number of stablecoins such as USDC are issued through the trading platform. This not only promotes investment and trading in crypto assets but also enables the exchange between fiat currency and digital currency.

1.2 Web 3.0: The New Internet Era Driven by Artificial Intelligence

1.2.1 The Booming Development of AI

With the rapid evolution of AI technology, we have entered the Web 3.0 era with AI at its core. This marks a revolutionary advancement in technology and profound changes in education, ethics, global policies, and daily life. From GPT-3 to ChatGPT and then to Sora, the evolution of AI technology has far exceeded our imagination.

Although Sora's current performance has not yet met human expectations, the iteration of the model is a gradual process, which makes us full of anticipation for its future. Sora's potential in complex creative tasks (such as movie production) especially demonstrates significant progress in AI's ability to handle high-level cognitive tasks. The development of this technology not only improves task-processing efficiency but also triggers extensive discussions about the future development direction of AI and its impact on human society.

Meanwhile, although the concept of artificial general intelligence (AGI) is eye-catching, vertical application-oriented robots currently have greater market potential due to their ability to address specific needs. I believe that with the maturation of technology, the reduction of costs, and the increase in market demand, AGI will eventually become a reality and may completely transform the way we work and live.

Overall, we can divide the "capabilities" of AI that bring about productivity changes into two aspects: improving production efficiency and realizing content production transformation.

1.2.2 Improving Production Efficiency

It is easy to notice that as an advanced productivity tool, AI is gradually taking over some tasks that originally required human labor. Take the content generated by ChatGPT as an example. Simply inputting a few keywords can generate articles and planning outlines that basically meet the requirements. Although AI currently does not possess true creativity, its ability to handle repetitive tasks and fixed-logic tasks is impeccable. This may herald the advent of a new productivity revolution.

1.2.3 Realizing Content Production Transformation

In the field of content production, generative AI, digital avatars, and other technologies are bringing about a transformation, which is known as AI-generated content (AIGC). The new-generation AIGC technology can not only handle text and voice but also create code, images, videos, and even robotic movements. These technological advancements make future Internet applications such as VR/AR and the metaverse more promising.

For this reason, the development of AI technology has transcended national boundaries, and its impact extends to all of humanity. Relying on past technological-based wars to contain other countries is clearly no longer applicable. Currently, the international landscape is influenced by important factors such as politics and the economy. In the process of the global development of AI technology and the exploration of its true value, countries need to seek more cooperation rather than confrontation, which will help promote global peace and development. Although the United States has an advantage in some AI fields, China also has its own advantages and the necessary conditions for achieving breakthroughs. Facing a severely competitive international environment, China needs to strengthen independent technological innovation, including the research and development of hardware (such as chips), software, and AI algorithms, collect more comprehensive data, and focus on the development of vertical fields. These strategies can gradually help China reduce its dependence on external technologies and enhance its position in international technological competition.

1.2.4 The Combination of AI and Web 3.0

In the wave of digital technology, the combination of AI and Web 3.0 is leading a new technological revolution. The rapid development of AI coincides with the new bull market in the Web 3.0 market, making "AI + Web 3.0" a highly-concerned field today. The relationship between AI and Web 3.0 is subtle and profound. On the one hand, AI has set off a revolutionary wave in traditional productivity, while the blockchain in Web 3.0 has changed traditional production relations, being more in line with human nature. Therefore, people are full of expectations for the combination of these two technologies, hoping that it will give birth to amazing projects.

On the other hand, the focuses of AI and Web 3.0 do not completely overlap. AI requires a large amount of computing power and data to train models, while Web 3.0 emphasizes the use of a decentralized, fair, and transparent public ledger to transmit information and value more securely and efficiently.

Currently, AI, with its ability to improve production efficiency and stimulate innovation, is changing the way we handle data and make decisions. From data collection and pre-processing to model iteration, review, reasoning, and finally to deployment and monitoring, every step of AI is precise and efficient. The core of Web 3.0—decentralization of data rights confirmation, new token economies, and the construction of public trust-provides an ideal platform to ensure data transparency and security. It can be seen that the influence of "AI + Web 3.0" on the economic system and financial market has already begun to emerge.

When AI meets Web 3.0, the two technologies complement each other's advantages, jointly solving each other's technical pain points and achieving their respective development. This integration not only brings new business models and values but also indicates the future development direction of technology.

Specifically, the combination of the two can be divided into three layers: the infrastructure layer, the middle layer, and the application layer. At the infrastructure layer, AI's big-data processing capabilities can optimize Web 3.0's decentralized network, making data storage and distribution more efficient. In the middle layer, AI's analysis capabilities can deeply explore the potential value of scattered data and automatically and intelligently handle many complex situations in Web 3.0, promoting the business extension and development of the latter. At the application layer, AI enables global users to access Web 3.0 more smoothly, promotes breakthroughs in data processing and analysis, and helps design financial products that are more in line with market demands and user preferences by analyzing market trends and interpreting user behavior.

Next, we will explain the ways in which AI and Web 3.0 are combined from the infrastructure layer, the middle layer, and the application layer respectively.

1.2.5 Infrastructure Layer

The combination of Web 3.0 and AI shows amazing potential at the infrastructure layer. Just imagine: Web 3.0 provides AI with decentralized computing resources, datasets, storage resource networks, algorithm models, and computing power. The explosive growth of AI applications has put forward higher-performance and lower-cost requirements for computing power, and Web 3.0 can just pool idle and scattered infrastructure resources to meet AI's needs for storage and computing services.

In AI model training, personal privacy and data security are of utmost importance. In the Web 3.0 environment, data privacy and security are particularly crucial. Web 3.0's encryption technologies (such as data encryption, cryptographic computing, secure parameter sharing, and encrypted result processing) can ensure that data is not leaked during use. These decentralized encryption technologies are

8.4 Recommendations for the Future Development of RWA and Tokenization

Driven by digitalization, RWA (Real World Assets) and tokenization, as innovative financial tools, are transforming our traditional views on asset ownership and transactions. The tokenization of RWA leverages blockchain technology to enhance asset liquidity, lower investment thresholds, and increase market transparency. In terms of traditional financial innovation, future efforts should focus on establishing corresponding regulatory frameworks, strengthening technological infrastructure, improving investor education, promoting cross-industry collaboration, advancing standardization and regulatory improvements, and encouraging technological innovation and platform development. In terms of compliance, ensuring that the origin and ownership of assets can be verified and meet AML (Anti-Money Laundering) and KYC (Know Your Customer) requirements is essential. On the technical front, upgrades to technology platforms, integration of oracles, enhancement of cross-chain interoperability, and data security and privacy protection are necessary. Future efforts should explore new application scenarios and business models for integrating AI.

8.4.1 The Impact of RWA and Tokenization on the Traditional Financial Industry and Future Development Recommendations

As technology advances and the regulatory environment gradually improves, tokenization is expected to become a significant direction for the financial industry, injecting more vitality and growth potential into the global economy.

For the financial industry, tokenization significantly enhances asset liquidity by enabling rapid transactions on the blockchain. This innovative approach allows investors to buy and sell assets almost in real time, breaking the limitations of traditional markets and greatly enhancing asset liquidity. Additionally, tokenization lowers investment thresholds. Since investors can purchase a fraction of high-value assets at a lower cost, it opens doors for ordinary investors to participate in markets that were previously accessible only to a few. The immutability of blockchain technology brings unprecedented transparency to the market. All transaction records are public, and anyone can verify the authenticity of transactions, increasing market trust and enhancing the transparency of the entire transaction process. Finally, tokenization provides vast space for innovative financial products and services. Financial institutions can now develop token-based derivatives and structured products, offering investors more investment options and risk management tools.

Regarding regulation, regulatory agencies in various countries should actively build and improve regulatory systems that adapt to the characteristics of tokenized assets. This requires clear rules to ensure the legality of assets, the protection of investor rights, and establish preventive measures to prevent financial risks.

The regulatory framework should cover the transparency of the tokenization process, the verification of asset entities, and the auditing and monitoring of assets. At the same time, regulatory agencies should collaborate with international organizations to form globally unified regulatory standards to address the challenges of cross-border transactions.

For the future integration of traditional finance with RWA and tokenization, the following recommendations are proposed:

- **Strengthening Blockchain Technology Infrastructure**: To support the widespread application of tokenized assets, it is essential to strengthen the construction of blockchain technology infrastructure. This includes improving network scalability, security, and interoperability. Scalability is key to handling large transactions, while security is the foundation for protecting assets from harm. By developing cross-chain technology, seamless connections between different blockchain platforms can be achieved, promoting the free flow and trading of assets. Additionally, privacy protection technologies (such as zero-knowledge proofs) should be adopted to enhance user trust in the platform.
- **Enhancing Investor Education**: Improving investors' understanding and awareness of the risks associated with tokenized assets is crucial. Education on tokenized assets, market dynamics, and risk management should be provided through various forms, such as online courses, seminars, and university programs. Furthermore, establishing and improving investor protection mechanisms is essential to ensure that investors have adequate channels for complaints and compensation in case of losses, such as setting up investor education funds and insurance mechanisms.
- **Deepening and Expanding Cross-Industry Collaboration**: Exploring collaborations with a broader range of industries (such as energy, agriculture, and healthcare) can unlock the potential of RWA tokenization in these sectors. Such collaborations can help these industries achieve enhanced asset liquidity while bringing new growth opportunities to the financial sector. For example, tokenization can digitize physical assets like land and crops in the agricultural industry, allowing investors to flexibly divide and trade their interests.
- **Promoting Standardization and Regulatory Improvements**: Strengthening cooperation with international standardization organizations to develop unified standards for tokenized assets, including specifications for security, transparency, and compatibility. Simultaneously, collaborating with government agencies to promote the formulation of laws and regulations that support the healthy development of tokenized assets, protecting investor rights and mitigating financial risks.
- **Encouraging Technological Innovation and Platform Development**: Fintech companies should develop more advanced blockchain technologies to improve the efficiency and security of tokenized asset transactions. They should support establishing comprehensive tokenized asset platforms that integrate issuance, trading, and management functions, providing one-stop services for assets. For

example, specialized blockchain networks can be developed to support large-scale tokenized asset transactions while ensuring transparency and traceability.

- **The exploration and promotion of new business models:** Encourage the creation of new financial products based on blockchains, such as tokenized bonds, stocks, and other derivative products. These products can provide investors with new investment channels in traditional and emerging markets. At the same time, explore the application of tokenization combined with AI and big data technology, such as using AI for asset evaluation and risk management, to improve the intelligence and precision of tokenized asset management.

8.4.2 Future Development Suggestions for RWA and Tokenization in the Regulatory Context

Regulative issues play a crucial role in developing RWA and tokenization. A comprehensive regulatory framework should ensure that all related activities comply with applicable legal and regulatory requirements. This framework should cover evaluating, issuing, trading, managing, storing, and auditing assets while verifying their source and ownership rights and meeting AML and KYC requirements.

At the same time, establishing good communication and cooperation with financial regulatory authorities is also extremely important. Through proactive dialogue with regulatory authorities, companies can promptly understand the latest regulatory dynamics and integrate regulatory requirements into tokenization strategies at an early stage. Collaborating with regulatory technology (RegTech) tools can also automate compliance processes, improve compliance efficiency, and reduce labor costs and error rates.

Since tokenized assets often involve cross-border transactions, promoting international cooperation to establish common standards and regulatory frameworks is key. Cooperation with regulatory authorities and industry organizations in different countries can help establish international tokenization standards, simplify the complexity of cross-border transactions, and protect investors' interests.

Furthermore, regular training and education for industry professionals, regulatory officials, and legal advisors are necessary. Education can enhance the industry's awareness and capabilities in compliance, covering the latest tokenization technologies, regulatory changes, and compliance practices.

Enhancing the transparency of tokenized assets and establishing a robust reporting system are key measures to improve compliance.

All transactions and asset flows should be traceable and queryable. Companies should regularly report their operational status to regulatory authorities, including but not limited to transaction records, asset evaluation, and risk management.

Advanced data protection technology should be integrated into the design and operation of tokenization platforms to ensure the security of user data and transaction information while also complying with data protection regulations such as the EU's GDPR.

Finally, a dedicated regulatory change management team should be established to monitor and analyze legal and policy changes related to global tokenization. This would ensure that companies can quickly adapt to legal changes and reduce compliance risks. Through these measures, a solid regulatory foundation can be laid for the healthy development of RWA and tokenization, enhancing investor confidence and promoting broader market acceptance and participation.

8.4.3 Future Development Suggestions for RWA and Tokenization in the Technical Context

Enhancing the construction of RWA and tokenization technology is key to promoting their future development. To achieve this goal, the following specific suggestions are made:

- **Technical Platform Upgrade**: Developing a more secure and efficient blockchain platform is the cornerstone of supporting RWA tokenization. For example, adopting sharding technology and Layer 2 solutions can significantly improve network transaction throughput and reduce transaction costs. This technological advancement not only enables larger-scale RWA tokenization and trading activities but also enhances the performance and scalability of the entire blockchain network. By integrating these technologies, a more robust and efficient blockchain ecosystem can be constructed to provide strong technical support for large-scale asset tokenization.
- **Oracle Integration**: Integrating reliable Oracle services into the blockchain platform ensures that smart contracts can accurately reflect the value and status of assets. Oracles serve as a bridge between on-chain and off-chain data, which is crucial for ensuring the authenticity and reliability of RWA tokenization. They can provide real-time market data, asset valuation, and other key information, ensuring that smart contracts operate based on the most up-to-date and accurate data, thereby enhancing investor confidence and market transparency.
- **Cross-chain Interoperability**: Developing cross-chain technology is essential for achieving asset and data flow between different blockchains. Implementing this technology can give users a broader range of investment options and more flexible asset management methods. Cross-chain interoperability enhances the connectivity between different blockchain ecosystems and allows assets to flow freely between multiple blockchain platforms, opening up a broader global market for investors.
- Data security and privacy protection. Advanced encryption technology (such as zero-knowledge proofs) can verify asset ownership and transaction authenticity without disclosing user privacy. This technology can ensure transaction transparency and security while protecting user privacy and avoiding leaking sensitive information. Through such technological applications, user trust in the platform can be enhanced, promoting more user participation in RWA tokenization.