

1. Record Nr.	UNISA996485665203316
Autore	Charles Wendy
Titolo	Blockchain in life sciences // Wendy Charles
Pubbl/distr/stampa	Singapore : , : Springer, , [2022] ©2022
ISBN	9789811929762 9789811929755
Descrizione fisica	1 online resource (349 pages)
Collana	Blockchain Technologies
Disciplina	005.74
Soggetti	Blockchains (Databases) Life sciences - Data processing
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Intro -- Foreword -- Preface -- Acknowledgments -- Contents -- About the Editor -- Abbreviations -- List of Figures -- List of Tables -- Blockchain Uses and Real World Evidence -- Introduction to Blockchain -- 1 Introduction -- 2 Blockchain Core Characteristics -- 2.1 Ledgers -- 2.2 Cryptography -- 2.3 Immutability (Tamper Evidence and Tamper Resistance) -- 2.4 Distribution -- 3 Blockchain Features -- 3.1 Permissionless Versus Permissioned -- 3.2 Permissionless -- 3.3 Off-Chain Versus On-Chain Storage -- 3.4 Smart Contracts -- 4 Blockchain Benefits for Life Sciences -- 4.1 Trust -- 4.2 Audit Trails-Provenance -- 4.3 Data Transparency Versus Privacy -- 4.4 Security -- 4.5 Performance -- 5 Conclusions -- 6 Key Terminology and Definitions -- References -- Blockchain in Pharmaceutical Research and the Pharmaceutical Value Chain -- 1 Brief Overview of Pharmaceutical Research -- 1.1 Drug Delivery and Discovery -- 1.2 Challenges Associated with Drug Delivery and Discovery -- 1.3 Challenges Associated with Preclinical (i.e., In Vitro, In Vivo) and Phase 0/I-IV Studies -- 2 Introduction of the End-To-End Pharmaceutical Value Chain -- 2.1 Five Main Categories: (1) Research and Discovery, (2) Clinical Development, (3) Manufacturing and Supply Chain, (4) Launch and Commercial Considerations, and (5) Monitoring and Health Records -- 2.2 Differentiating Pharmaceutical Value Chain

from Pharmaceutical Supply Chain -- 3 Blockchain Efforts Within Pharmaceutical Industry -- 3.1 Pharmaceutical Users Software Exchange (PhUSE) Blockchain Project -- 3.2 Innovative Medicines Initiative (IMI) Blockchain-Enabled Healthcare -- 3.3 The MELLODDY Project and Millions of Molecules Blockchain + Smart Contracts for Human Participant Regulations and Consent Management -- 3.4 Information Exchange and Data Transformation (INFORMED) Initiative -- 3.5 Moneyball Medicine.

4 Mapping Blockchain Characteristics to Pain Points in the Pharmaceutical Value Chain -- 4.1 Adapted Fit-For-Purpose Framework and Design Elements -- 4.2 Matching Characteristics (e.g., Decentralized, Distributed, Conditionally Immutable, Scalable, Cryptographically Secured) to Identified Pain Points in Each of the 5 Categories -- 5 Blockchain-But Not in a Vacuum -- 5.1 Blockchain-Complementary Established and Emerging (e.g., Machine Learning, Artificial Intelligence) Technologies for the Pharmaceutical Value Chain -- 6 Debunking Myths Around Challenges with Blockchain -- 6.1 The Myth of the Technical Challenge -- 6.2 The Reality of Challenges Tied to Change Management, Resource Allocation, Paradigm Shift, and Reaching Consensus -- 7 Blockchain and The Idea Pipeline -- 7.1 Pharmacogenomics -- 7.2 Collaborative Pharmaceutical Development -- 7.3 Patient Access, Medication Reclamation, and Prescription Waste Reduction -- 7.4 The Evolution of the Traditional Retail Pharmacy -- 8 Future Directions -- 9 Conclusions -- References -- Blockchain-Based Scalable Network for Bioinformatics and Internet of Medical Things (IoMT) -- 1 Introduction -- 1.1 Data Ownership -- 1.2 Data in Blockchain-Based Network -- 2 Case Implementation of Internet of Medical Things (IoMT) with Real Ownership -- 2.1 The Synsal Network -- 2.2 Sensors, Device Engineering, and Scaling in the Synsal Network -- 3 Tokenization and Value Scaling in the Blockchain-Based Network of Hardware Devices -- 3.1 Tokenization and Value Scaling -- 3.2 Basic Stabilization Tokenomics -- 4 Future Directions -- 5 Conclusions -- References -- Blockchains and Genomics: Promises and Limits of Technology -- 1 Introduction: A Brief History of Capitalization on Genes -- 2 The Scientific and Market Value of Genomic Data -- 2.1 On the Nature of Data, and the Data of Nature -- 2.2 Fair and Sustainable Data Use.

3 Democratize, Decentralize, and Disintermediate Data (The Three Ds) -- 3.1 Blockchain Genomics: The Current Slate -- 4 Why Genomes Cannot Be Owned -- 5 How Shall We Treat Genes? -- 6 What About Non-Fungible Tokens, NFTs? -- 6.1 The Need for Regulation -- 7 Future Directions -- 8 Conclusions -- References -- Convergence of Blockchain and AI for IoT in Connected Life Sciences -- 1 Introduction -- 1.1 Fueling the Digital Transformation in Health and Life Sciences -- 1.2 Technology Unification -- 2 Harnessing the Power of Data-Driven Technologies in Life Sciences -- 2.1 Data-Driven Technologies in Life Sciences -- 3 Innovating in a Highly Regulated Industry -- 4 Essential Elements for Data Strategy in Life Sciences -- 4.1 Data Building Blocks -- 5 Prioritizing Risk Management in Life Sciences -- 6 Opportunities and Challenges for Emerging Digital Technologies in Life Sciences -- 6.1 Major Milestones in Life Sciences Product Development -- 7 Strategic Planning Frameworks -- 7.1 Blockchain and AI to Mitigate Risks of IoT/BYOD -- 7.2 Blockchain-AI Platforms and Infrastructures -- 8 Future Directions -- 8.1 Human as a Platform -- 8.2 Thinking Beyond the Adoption of Technology -- 9 Conclusions -- References -- A Blockchain-Empowered Federated Learning System and the Promising Use in Drug Discovery -- 1 Introduction -- 2 Overview of Federated Learning and Blockchain --

2.1 Federated Learning -- 2.2 Barriers and Challenges in Drug Discovery -- 2.3 Challenges in Federated Learning -- 2.4 Blockchain Benefit for Federated Learning -- 2.5 The Benefits of Blockchain-Empowered Federated Learning for Drug Discovery -- 3 The Rahasak-ML Platform -- 3.1 Overview -- 3.2 Key Components -- 4 Rahasak-ML Federated Learning Process -- 4.1 Overview -- 4.2 Incremental Training Flow -- 4.3 Finalizing Model.

4.4 The Use Case of Blockchain-Empowered Federated Learning in the Medical Field -- 5 Future Directions -- 5.1 Data Heterogeneity -- 5.2 Efficiency and Effectiveness -- 5.3 Model Interpretation -- 6 Conclusions -- References -- Considerations for Ensuring Success of Blockchain in Life Sciences Research -- Valuing Research Data: Blockchain-Based Management Methods -- 1 Introduction -- 1.1 Nature of Health Data -- 1.2 Health Data Management -- 2 Data as an Asset -- 2.1 How to Value Data Assets -- 3 Data Sales Methods -- 3.1 Data Brokers -- 3.2 Centralized Data Marketplaces -- 3.3 Decentralized Data Marketplaces -- 3.4 Non-Fungible Tokens -- 4 Considerations -- 4.1 Ethical Considerations -- 4.2 Ownership -- 4.3 Data Considerations -- 5 Recommendations -- 5.1 Ethical Recommendations -- 5.2 Data Recommendations -- 5.3 Legal Recommendations -- 6 Future Directions -- 6.1 Regulations -- 6.2 Future Research -- 7 Conclusions -- 7.1 Key Terminology and Definitions -- References -- Blockchain Adoption in Life Sciences Organizations: Socio-organizational Barriers and Adoption Strategies -- 1 Introduction -- 2 Background Literature -- 3 Research Methods -- 4 Findings -- 4.1 The State of the Blockchain + Life Sciences Ecosystem -- 4.2 Socio-organizational Barriers for Blockchain Adoption in Life Sciences -- 4.3 Barrier 4: The Lack of an "Ecosystem" Mindset -- 4.4 Adoption Strategies -- 5 Discussion -- 5.1 Limitations and Future Directions -- 6 Conclusion -- References -- Blockchain Governance Strategies -- 1 Introduction -- 2 Defining Governance -- 3 A Deeper Dive: Blockchain Governance -- 3.1 On-Chain Governance -- 3.2 Off-Chain Governance -- 4 Types of Ecosystem Governance Decisions -- 5 Common Blockchain Governance Strategies -- 5.1 Founder Led/Benevolent Dictator -- 5.2 Core Development Team -- 5.3 Federations or Alliances -- 6 Ecosystem Roles.

7 Typical Ecosystem for Life Sciences Blockchain -- 7.1 Special Considerations for Life Sciences -- 8 Recommendations -- 9 Future Directions -- 10 Conclusions -- References -- Life Sciences Intellectual Property Through the Blockchain Lens -- 1 Introduction -- 2 The Emergence of Blockchain in Life Sciences -- 3 The Intersection of Blockchain and Life Sciences IP Rights in the United States -- 3.1 Patents -- 3.2 Trademarks and Trade Dress -- 3.3 Trade Secrets -- 3.4 Copyrights -- 4 Transferring IP Rights Through Blockchains -- 5 Managing IP Rights Through Blockchain -- 6 Blockchain in Adversarial Proceedings Involving IP Rights -- 6.1 Anticounterfeiting -- 7 Future Directions -- 8 Conclusions -- References -- Regulatory Compliance Considerations for Blockchain in Life Sciences Research -- 1 Introduction -- 1.1 Regulatory Agency Uses of Blockchain -- 1.2 Regulatory Applicability -- 2 Regulatory Review and Documentation -- 2.1 System Design and Documentation -- 2.2 System Protection Features -- 2.3 Record and Signature Integrity -- 2.4 Verification and Validation -- 2.5 Training -- 3 Outsourcing -- 4 Future Directions -- 4.1 Standards -- 4.2 Blockchain Education -- 4.3 Research -- 5 Conclusions -- 5.1 Key Terminology and Definitions -- References -- The Art of Ethics in Blockchain for Life Sciences -- 1 Introduction -- 2 Digital Ethics Programs Design for Blockchain in Life Sciences -- 2.1 General Application of Digital Ethics Across the Life Sciences

Continuum -- 2.2 Research -- 2.3 Genomics and Precision Medicine --
2.4 Digital Identity -- 3 Cultural, Legal, and Socioeconomic Influences
-- 4 Blockchain Ethics and Purpose in Life Sciences -- 5 Future
Directions: Disruption, Innovation, Evolution -- 6 Conclusions --
References -- Cybersecurity Considerations in Blockchain-Based
Solutions -- 1 Introduction -- 2 Blockchain Solution Architecture.
2.1 Network and Architecture Types.
