

---

## Standards for the New Economy

Pasquale Giungato<sup>1</sup>, Roberto Leonardo Rana<sup>2</sup>, Caterina Tricase<sup>2</sup> and Zenon Foltynowicz<sup>3</sup>

<sup>1</sup> University of Bari Aldo Moro, Bari, Italy.

<sup>2</sup> University of Foggia, Foggia, Italy.

<sup>3</sup> Poznan University of Economics and Business, Poznań, Poland.

E-mail: pasquale.giungato@uniba.it; E-mail: roberto.rana@unifg.it;

E-mail: caterina.tricase@unifg.it; E-mail: zenon.foltynowicz@ue.poznan.pl

---

**Please cite this paper as:**

Giungato, P., Rana, R.L., Tricase, C. and Foltynowicz, Z. 2021. Standards for the New Economy. In: R. Pamfilie, V. Dinu, L. Tăchiciu, D. Pleșea, C. Vasiliu eds. 2021. *7th BASIQ International Conference on New Trends in Sustainable Business and Consumption*. Foggia, Italy, 3-5 June 2021. Bucharest: ASE, pp. 441-447 DOI: 10.24818/BASIQ/2021/07/057

---

### Abstract

*Purpose/objectives:* many of the products and services we use are designed and developed following International Standards like ISO (The International Organization for Standardization, ISO). Standards affect most of the global trade and represent a fundamental driving force for new technologies. Standards provide an adaptive and responsive approach to manage innovation in the new economy, for this reason, the creation and use of consistent standards, through the input of both the private sector and governments, is fundamental for the medium to the long-term sustainable development of the new economy.

*Design/methodology:* in this paper, a qualitative analysis of standards developments in blockchain and in AI have been performed, focusing on the new economy paradigms.

*Originality/value:* the integration between cryptocurrencies based on blockchain technology and existing networks, trading and software accounting systems and other clearing networks rely on, results almost difficult to obtain, due to a series of relevant issues among which the most relevant is the lack of a standard and in this paper we have analyzed the state of the art in the development of new standard for the new economy.

*Findings:* as main results, recently ISO standards are providing fundamental definitions for blockchain and, in general, of distributed ledger technologies, the first step toward the implementation of more extended standards allowing widespread adoption of blockchain by industries and governments. In parallel, numerous International Standard Developing Organizations are developing and publishing AI-related standards including actionable steps to underpin a framework for the 'responsible stewardship of trustworthy AI'. This includes the design, development, and deployment of AI internationally, through the OECD Principles on AI.

*Possible practical implications:* these initiatives will surely foster the development of two key technologies for the new economy, with practical implications in Industry 4.0 and the Internet of Things (IoT).

### Keywords

Blockchain, distributed ledger, cryptocurrency, Artificial Intelligence, ISO standard, new economy, Industry 4.0, Internet of Things

DOI: 10.24818/BASIQ/2021/07/057

---

## Introduction

According to ISO/IEC Guide 2:2004 Standardization and related activities- General vocabulary, a standard is “a document, established by consensus and approved by a recognized body, that provides for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context” (ISO/IEC, 2004). The adoption of standards all over the world would facilitate technology innovation by defining and establishing common rules for product differentiation, technological innovation, and other value-added services, fostering a widespread, interoperable and efficient marketplace. Standards generally specify requirements, specifications, guidelines, or characteristics that can help to ensure that emerging technologies and systems meet critical objectives for functionality, interoperability, and trustworthiness- and that can work as accurately, reliably, and with safety tools. Most of the products and services we use daily are designed and developed following international standards in which ISO standards play a key role. Standards affect 80% of global trade and are important concerning emerging technologies, like blockchain and AI. Standards provide a strong approach to manage emerging technologies in the new economy as 80% of global trade valuable in 4 trillion USD/y is regulated by standards or similar technical regulations (McShea, 2017). Use of standards, created by the fostering of both governments and private sectors, is crucial for the global new economy in long-term sustainable development. International Standards in ICT have increased integration across platforms, ensured quality, lowering trade barriers, building greater public and user awareness in digital products and services. Standards, such as the ISO and IEC, have enabled agreement among extended commercial environments, on issues as quality management (ISO 9001), cloud computing (ISO/IEC 27017) and information security (ISO/IEC 27001). Standards can lead to the development of risk management approaches as well as more detailed technical solutions that provide guidance on these principles in companies, customer bases, and the wider community. In this paper, we focused on the development of standards for the new economy in blockchain and artificial intelligence (AI), two emerging technologies that probably will be the driver for the development of new economies. In this paper, the importance and needs of a standard for blockchain-based cryptocurrencies and standards in AI will be highlighted and future developments of technical standards depicted. Possible practical implications will be the implementation of a widely recognized blockchain-based public ledger of a transaction, characterized by immutability, useful for the management of numerous public and private services. Adopting recognized standards is the first step towards intergovernmental recognition of a technology that can drive current industrial revolutions such as Industry 4.0 and the Internet of Things.

## Literature review and Research methodology

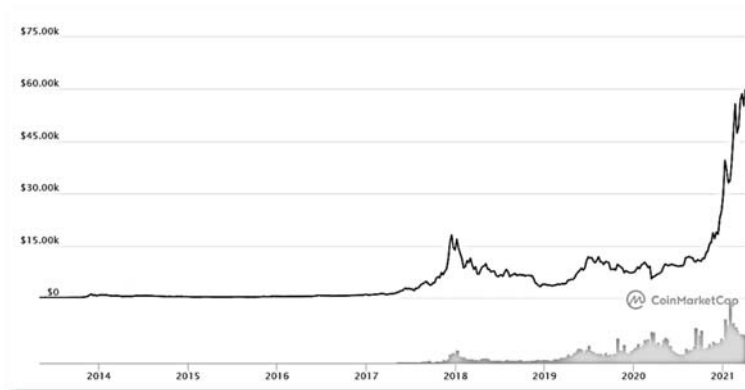
The specific procedure for identifying, selecting, analyzing and report synthetically the relevant articles on the given topic, has been performed in the way to obtain rigorous, transparent and robust results typic of a deep analysis. The prior art of the research area investigated has been explored with a specific method which involves the definition of conceptual boundaries of the research, the selection of scientific papers and reports using the operator typic Boolean operators, and by defining the time period of the collected papers. The databases utilized were Scopus, Web of Science, Science Direct, but excluding duplicates, note, letter, conference articles, or article/reports not published in English.

## Results and Discussion

### *Standards in blockchain and related technologies*

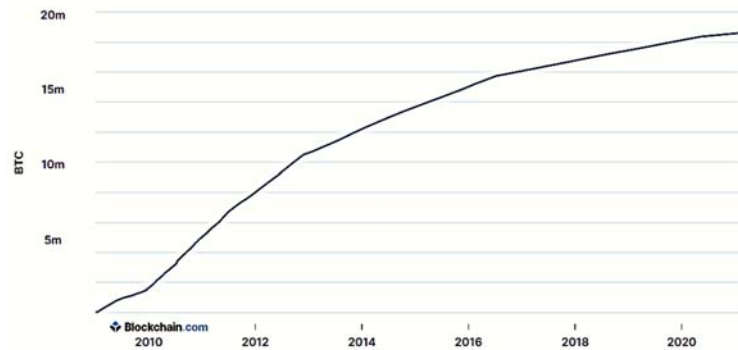
Cryptocurrencies have rocketed both in values and in numbers, following a feeling of freedom felt by people transacting without a centralized authority. Following the launch of Bitcoin, cryptocurrencies have increased to about 9,100, and new launches are being observed day after day (CoinMarketCap, 2021). Bitcoin prices have fluctuated but since March 2020, with the beginning of the Coronavirus outbreak, prices rocketed to about 60,000 USD per Bitcoin, maybe driven by fears of a collapse of the economy (figure 1). The feeling of the cryptocurrencies as haven assets has increased in the last year, pushing demand and prices. Bitcoin remains the most capitalized cryptocurrency (\$1,115,941,778,371) followed by Ethereum, Binance Coin, Tether, Polkadot, Cardano, XRP, Uniswap, Litecoin. Among the most top-capitalized the hash rate is: Bitcoin (165.62 Eh/s), Ethereum (483.32 Th/s), Lite coin (70.50

Th/s). Total Bitcoins mined at the date (03 April 2021) were about 18.671 million (Blockchain.com, 2021) representing about 88.9% of the total available (as an ultimate resource recovery of 21 million) as seen in figure 2. As cryptocurrencies are adopted by people, the focus on the underlying blockchain technology has rocketed as the advantages of the adoption of a distributed ledger of the transaction, in numerous public and private applications, have been fully recognized (Mashamba-Thompson TP. Et al., 2019; Nurgazina, et al., 2021; Jagtap, et al, 2021). Blockchain solutions in public and private systems are growing from 1.5 billion in 2018 probably to 15.9 billion by 2023 in which the financial sector contributes about 60% of the market value of blockchain worldwide in 2018. Worldwide spending for blockchain solutions in 2020 is about 4.1 bn USD with banking the sector with the highest distribution of blockchain market value (Liu, 2020). The diffusion of the blockchain has highlighted some flaws in the technology that only recently have been addressed: the Bitcoin system stands up due to miners, whose rewards sustain the entire distributed ledger technology network, but the electricity consumption arising from computational tasks necessary to validation of a block is very high a pose of a serious threat to the sustainability of the system. Although no trace of a carrying capacity arises from the analysis of Bitcoin issued over time (Giungato, et al., 2017; Rana et al., 2019) new form of blockchains have been issued, in which a block reward is given to miners after a block is confirmed in a blockchain system, maybe in the form of a token instead of a cryptocurrency. This token is a digital asset that represents a collection of electronic entitlements, or anything that has value to a stakeholder. To protect an electronic fee collection (EFC) an ISO norm describes several steps: the definition of the security objectives and policy statements in a security policy, a threat analysis with a risk assessment to define the security requirements, and the development of the security measures followed by the development of security test specifications (ISO 19299:2020). Another important issue to be addressed in the blockchain solution is the privacy protection of personal information, which poses a serious threat to the diffusion of this technology in smart contracts and sanitary distributed databases, as an example. For these reasons, a technical committee is developing a new standard on the protection of sensitive data, privacy, and personally identifiable information (PII) on blockchain-based and distributed ledger technology systems (ISO/TR 23244:2020). In the field of smart contracts also there exists numerous terms and to solve the confusion, a technical committee published a report, focused on interactions between smart contracts in blockchain and distributed ledger technology systems (ISO/TR 23455). Moreover, other technical committees are developing new standards in the field, like the ISO/TR 3242, Blockchain and distributed ledger technologies - Use cases, the ISO 23257, Blockchain and distributed ledger technologies - Reference architecture, the ISO/TS 23635, Blockchain and distributed ledger technologies - Guidelines for governance (Naden C., 2020). The ISO standard document subject of this work was prepared by Technical Committee ISO/TC 307, "Blockchain and distributed ledger technologies", following rules and guidelines set by ISO/TC 37, "Language and terminology". The norm is recognized as contributing to the Sustainable Development Goal of Industry, Innovation, and Infrastructure, the number 9 goal of the United Nations 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015 (United Nations, 2015).



**Figure no. 1. Bitcoin prices (USD) from launching to Apr. 03, 2021**

*Source: CoinMarketCap, 2021*



**Figure no. 2. Bitcoins mined from launching to Apr. 03, 2021.**

Source: <https://www.blockchain.com/charts/total-bitcoins>, 2021

To allow Bitcoin to enter the database tables used by MasterCard, PayPal, SWIFT, Visa, an ISO currency code is needed as regulated by the ISO 4217:2018 that defines alpha-numeric codes for the representation of currencies. Bitcoin in this standard may have the first alpha code as "X" used for supranational currencies, procedural purposes, and several precious metals which are similar to currencies (ISO 4217:2018). In this case, the code for Bitcoin may be the "XBT" and finally, Bitcoin can enter the existing networks, trading and software accounting systems and other clearing networks rely on (Matison, 2014). Other technical committees are developing new standards to solve privacy issued and smart contract misunderstandings. IoT may benefit from the adoption of a blockchain-based database as a data-sharing framework or platform that is needed to motivate devices to exchange data. As a distributed ledger technology, blockchain has the potential to solve the above issues, due to its nature of data transparency, distributed operation, and reliability. Devices do not need to communicate with a central server, using its computational power, but the processing of data may be managed locally (Du, et al., 2021).

#### *Standards in AI and related technologies*

Standards can play a constructive role in enabling the widespread use of responsible AI, as an example, they can establish common building blocks and risk management frameworks, for companies, governments, and other organizations.

NIST has recently released a document focused on the importance of trustworthiness incorporated in AI standards, following an Executive Order (EO 13859, February 11, 2019) of the President directing Federal agencies to take a variety of steps designed to ensure that the U.S. maintains its leadership position in AI. This order emphasizes the importance of AI to the future of the U.S. economy and national security, recommended that AI standards will articulate requirements, specifications, guidelines, or characteristics that can ensure that technologies in AI meet quality standards for interoperability, functionality, and trustworthiness, and that they can be accurate, reliable, and safe (Kimball, 2019). The document is focused on the following themes related to the AI: Concepts and Terminology, Data and Knowledge, Human Interactions, Metrics, Networking, Performance Testing and Reporting Methodology, Safety, Risk Management and Trustworthiness. The issue of trustworthiness is crucial as today there exists a lack of the ability to understand and analyze the decisions of AI systems and to measure their trustworthiness in particular to address the bias in machine learning (Emmert-Streib, 2021). All these aspects should have been considered early in the design process of AI technologies and should be tested during the development and use phase. Since 2017, fourteen of the world's most advanced economies have announced huge investments in focused AI programs and activities. This unexpected growth in AI and the related investments has the potential to transform the lives of Australians, who have already been the early adopters of this technology. However, concerns have been raised about the impact of AI on the future of work, although the technology lacks the essence of human intelligence as understanding the situations we experience, being able to grasp their meaning and this issue needs a different approach (Mitchell, 2019). The interest in AI standards has raised in regulating responsible design, distribution, evaluation of AI platforms, and to facilitate global adoption. Following a successful approach in Information and

Communication Technology (ICT), standards have fostered digital formatting, web accessibility, and information security. Standards have revolutionized the way we transport commodities including the humble shipping container. In the same way AI technical standards can provide developers with clear guidelines for the design of AI platforms to facilitate integration with other technologies. Developers are enticed to use the best practices for the safety, cybersecurity, and utility of their products. Moreover, standards in AI can be used to evaluate and compare different AI systems, e.g. in the legal requirement for ensuring transparency for a decision-making process in judicial decision-making. Without clear standards defining algorithmic transparency, it can be difficult to evaluate an AI system concerning the aforementioned requirements, or to distinguish if it does better than another different system; without these standards accepted in the scientific and programmers community the adoption of these technologies would be discouraged. Technical AI standards will be a key technology to determine whether an AI system is appropriate for use in a particular context like the legal one. A range of International Standard Developing Organizations are developing and publishing AI-related standards and 42 countries, have committed to the development of consensus-driven standards on AI, through the OECD Principles on AI (Cihon, 2019). The development of such Standards is taking place through the Artificial Intelligence Joint Technical Committee of ISO and IEC - (ISO/IEC JTC 1/SC 42). OECD, has developed a set of principles for AI that were endorsed by the OECD Ministerial Council in May 2019 and 42 countries have engaged themselves to these principles. The basic principle includes all the steps to design a framework for the “responsible stewardship of trustworthy AI” or the design, development, and deployment of AI internationally. These high-level value-based principles are:

- AI should benefit people and the planet by driving inclusive growth, sustainable development and well-being.
- AI systems should be designed in a way that respects the rule of law, human rights, democratic values and diversity, and they should include appropriate safeguards - for example, enabling human intervention where necessary - to ensure a fair and just society.
- There should be transparency and responsible disclosure around AI systems to ensure that people understand AI-based outcomes and can challenge them.
- AI systems must function in a robust, secure and safe way throughout their life cycles and potential risks should be continually assessed and managed.
- Organizations and individuals developing, deploying or operating AI systems should be held accountable for their proper functioning in line with the above principles.

It is important to note that the OECD principles encourage governments to “promote the development of multi-stakeholder, consensus-driven global technical standards for interoperable and trustworthy AI” (OECD, 2019; Standard Australia, 2020). The Joint Technical Committee (JTC) 1 is the major joint ISO and IEC ICT-focused Standards Committee and it was established to provide a forum for standards development concerning ICT and has developed commonly used standards including MPEG, JPEG, as well as standards on data governance and cybersecurity. In 2017, JTC 1 established Sub-Committee (SC) 42 to focus on standards development for AI systems. The major objectives of the Committee are to:

- Serve as the focus and proponent for JTC 1’s standardization program on Artificial Intelligence
- Guide JTC 1, IEC, and ISO committees developing AI applications.

Through the work of this committee, a new five-part series of standards and technical reports establishing a Big Data Reference Architecture (BDRA) and framework that organizations can use to achieve interoperability between BDRA systems has been developed. The series includes:

- ISO/IEC TR 20547-1: 2020 Information technology - Big data reference architecture - Part 1: Framework and application process
- ISO/IEC TR 20547-2:2018 Information technology - Big data reference architecture - Part 2: Use cases and derived requirements

- ISO/IEC 20547-3: 2020 Information technology - Big data reference architecture - Part 3: Reference architecture
- ISO/IEC 20547-4: 2020 Information technology - Big data reference architecture – Part 4: Security and privacy
- ISO/IEC TR 20547-5:2018 Information technology - Big data reference architecture - Part 5: Standards roadmap.

The SC 42 has so far published additionally one ISO/IEC standard and two Technical Reports (TR) related to AI:

- ISO/IEC 20546:2019 Information technology - Big data - Overview and vocabulary
- ISO/IEC TR 24028: 2020 Information technology - Artificial Intelligence (AI) - Overview of trustworthiness in Artificial Intelligence
- ISO/IEC TR 24029-1:2021 Artificial Intelligence (AI) — Assessment of the robustness of neural networks — Part 1: Overview

Currently, 22 projects of the Standards are under the responsibility of ISO/IEC JTC 1/SC 42, among others:

- ISO/IEC DIS 22989: Artificial Intelligence Concepts and Terminology
- ISO/IEC CD 23894 Information Technology — Artificial Intelligence — Risk Management
- ISO/IEC DTR 24027: Information technology - Artificial Intelligence (AI) - Bias in AI systems and AI aided decision making
- ISO/IEC AWI TR 24368 Artificial intelligence — Overview of ethical and societal concerns
- ISO/IEC AWI 42001 Information Technology — Artificial intelligence — Management system
- ISO/IEC WD TS 4213 Information technology — Artificial Intelligence — Assessment of machine learning classification performance
- ISO/IEC WD 5338 Information technology — Artificial intelligence — AI system life cycle processes
- ISO/IEC WD 5339 Information Technology — Artificial Intelligence — Guidelines for AI applications
- ISO/IEC WD 5392 Information technology — Artificial intelligence — Reference architecture of knowledge engineering
- ISO/IEC AWI TR 5469 Artificial intelligence — Functional safety and AI systems
- ISO/IEC CD 23894 Information Technology — Artificial Intelligence — Risk Management
- ISO/IEC AWI 42001 Information Technology — Artificial intelligence — Management system
- ISO/IEC TR 24030: Information technology - Artificial Intelligence (AI) - Use cases

In addition to JTC 1, ISO also has other committees that might have relevance to AI Standards development, including the aforementioned ISO/ TC 307 (blockchain and DLT) which Australia chairs. This committee with consumer representatives also participates in ISO's Consumer Committee (COPOLCO), which is undertaking a project exploring AI, primarily from a consumer perspective. IEC has undertaken significant work to support the standardization of AI and, in 2018, published a comprehensive Whitepaper that addressed the rise of AI, technical and social issues, and opportunities for standards development (IEC, 2018). The Institute of Electrical and Electronics Engineers (IEEE) has released several documents regarding the ethical design and development of AI through their Global Initiative on Ethics of Autonomous and Intelligent Systems. The IEEE Ethically Aligned Design document articulates five core principles to consider in the design and implementation of AI ethics and discusses these at length. These principles include adherence to existing human rights frameworks, improving human wellbeing, and ostensibly ensuring accountable and responsible design, transparent technology, and the ability to track misuse. Standards, in this context, might outline the specific risk management frameworks and controls that businesses might employ to manage access to information in a manner that protects and promotes privacy. In the past, international standards have either focused

on information security, as one element of a privacy-focused approach (through ISO/IEC/27001, for example) or focused on risk management more broadly through ISO 31000. Within the arrival of the Mandatory Notifiable Data Breach Scheme in Australia and the desire by some businesses to achieve a degree of harmonization with the GDPR (EU, 2016) on the protection of natural persons about the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation), such an approach, which builds on international frameworks and best practice, might be timely. ISO/IEC 27701, outlined below, provides one such live opportunity. In mid-2019, ISO/IEC 27701:2019 was published. This new standard, developed by JTC 1/SC27/Working Group 5, is an extension to the existing standard ISO/IEC 27001- Information Security. It provides a framework to continuously improve privacy controls for personal information within an organization of any size, through a Privacy Information Management System (PIMS). Currently, this standard is mapped against the European GDPR and might well be one of the constitutive elements of a global certification regime for the GDPR and privacy more broadly. Many stakeholders have proposed a certification model, which involves industry, governments, academia, and others, in shaping the outlines of what might be considered “responsible AI” (Finkel A., 2019). It is like a sort of certificate or “AI Trustmark” or also called a “Turing Certificate” which would be the symbol that a vendor and product are worthy of trust, as the standards certificates in the manufacturing industries assure the functioning of electrical or mechanical devices as they comply the related standards.

## Conclusions

Intergovernmental recognition of technology and its fostering needs the adoption of a recognized standard, which can be the driver of the revolution that Industry 4.0 and the Internet of Things have announced. The adoption of well-recognized standards widespread and accepted by governments would foster technology innovation by defining and establishing common rules for product characterization, quality management, enabling a widespread, integrated and efficient marketplace. In this context, numerous government institutions all over the world are pushing agencies to define the goals and objectives of standards in blockchain and AI. These emerging technologies may benefit greatly from the adoption of recognized standards, in various fields: from the money/cryptocurrencies exchange to AI development. In the last years, more and more efforts were made to push these technologies which can be the driver of the revolution in Industry 4.0 and the Internet of Things. There is an urgent need for standards for the new economy, to avoid mismatch in integration between different developed technologies or the issuing of standards that are not fit-for-purpose or not available when needed, or that are designed following wrong or different schemes. These issues can hamper innovation and development of reliable, robust, and trustworthy AI technologies generating constrain to the effective or timely development of the new economy. Global cooperation and coordination on ICT standards comprising blockchain and AI will be crucial to get a consistent set of rules to enable market competition, preclude trade barriers, and allow innovation to rocket. Moreover, these integrations may provide opportunities to reach the 17 United Nations Sustainable Development Goals together with the framework and concepts of circular economy (Hoosain M.S., 2020).

## References

- Blockchain.com, 2021. *The total number of mined bitcoin that are currently circulating on the network*, [online] Available at: <<https://www.blockchain.com/charts/total-bitcoins>> [Accessed 03 April 2021].
- Cihon P., 2019. *Technical Report: Standards for AI Governance: International Standards to Enable Global Coordination in AI Research & Development*. Oxford: Future of Human Institute, University of Oxford. [pdf] Available at: <[http://www.fhi.ox.ac.uk/wp-content/uploads/Standards\\_-FHI-Technical-Report.pdf](http://www.fhi.ox.ac.uk/wp-content/uploads/Standards_-FHI-Technical-Report.pdf)> [Accessed 03 April 2021].
- CoinMarketCap, 2021. *Cryptocurrency Prices, Charts and Market Capitalizations, Binance Capital Mgmt.*, [online] Available at: <<https://coinmarketcap.com/>> [Accessed 03 April 2021].
- Du, Y., Wang, Z. and Leung, V.C.M., 2021. Blockchain-Enabled Edge Intelligence for IoT: Background, Emerging Trends and Open Issues. *Future Internet*. 13(2), Article number: 48.

- Emmert-Streib, F. 2021. From the Digital Data Revolution toward a Digital Society: Pervasiveness of Artificial Intelligence. *Machine Learning and Knowledge Extraction* 3(1), pp.284-298.
- EU, 2016. Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation). *Official Journal of the European Union* L 119/1 - 4.5.2016.
- Finkel A., 2018. *What will it take for us to trust AI?* *World Economic Forum*, [online] Available at: <<https://www.weforum.org/agenda/2018/05/alan-finkel-turing-certificate-ai-trust-robot/>> [Accessed 03 April 2021].
- Giungato P., Rana R.L., Tarabella A. and Tricase C. 2017. Current Trends in Sustainability of Bitcoins and Related Blockchain Technology. *Sustainability*, 9(12), Article number: 2214.
- Hoosain M.S., Paul B.S. and Ramakrishna S., 2020. The Impact of 4IR Digital Technologies and Circular Thinking on the United Nations Sustainable Development Goals. *Sustainability*. 12(23), Article number:10143.
- IEC, 2018. *International Electrotechnical Commission. White Paper: Artificial intelligence across industries*. Geneva, [online] Available at: <<https://basecamp.iec.ch/download/iec-white-paper-artificial-intelligence-across-industries-en-jp>> [Accessed 03 April 2021].
- ISO 19299:2020. *Electronic fee collection - Security framework*. The International Organization for Standardization.
- ISO/IEC 2004. *Guide 2. Standardization and related activities - General vocabulary*. The International Organization for Standardization.
- ISO/TR 23244:2020. *Blockchain and distributed ledger technologies - Privacy and personally identifiable information protection considerations*. The International Organization for Standardization.
- ISO/TR 23455:2019. *Blockchain and distributed ledger technologies – Overview of and interactions between smart contracts in blockchain and distributed ledger technology systems*. The International Organization for Standardization.
- Jagtap S., Bader F., Garcia-Garcia G., Trollman H., Fadiji T., Salonitis K. 2021. Food Logistics 4.0: Opportunities and Challenges. *Logistics*, 5(1), Article number: 2.
- Kimball K.A., 2019. *US Leadership in AI: A Plan for Federal Engagement in Developing Technical Standards and Related Tools*. Washington: NIST (US Department of Commerce). [pdf] Available at: <[https://www.nist.gov/system/files/documents/2019/08/10/ai\\_standards\\_fedengagement\\_plan\\_9aug2019.pdf](https://www.nist.gov/system/files/documents/2019/08/10/ai_standards_fedengagement_plan_9aug2019.pdf)> [Accessed 03 April 2021].
- Shanhong L., 2020. *Blockchain - Statistics & Facts* Mar 13, 2020 [online] Available at: <<https://www.statista.com/topics/5122/blockchain/>> [Accessed 03 April 2021].
- McShea J., 2017. *Market Size Share Forecast Trend Report 20 June 2017 – Global Standards Publishing Market 2017*. Outsell: Burlingame, California.
- Mashamba-Thompson TP, Crayton ED. 2019. Blockchain and Artificial Intelligence Technology for Novel Coronavirus Disease 2019 Self-Testing. *Diagnostics*, 10(4), Article number: 198.
- Matson J. 2014. *Why Bitcoin Needs an ISO-Certified Currency Code*. Oct 24, 2014 [online] Available at: <<https://www.coindesk.com/bitcoin-needs-iso-certified-currency-code>> [Accessed 03 April 2021].
- Mitchell M. 2019. Artificial Intelligence Hits the Barrier of Meaning. *Information*, 10(2), Article number: 51.
- Naden, C. 2020. *Getting Big on Blockchain*, [online] Available at: <<https://www.iso.org/news/ref2540.html>> [Accessed 03 April 2021].
- OECD Organization for Economic Co-operation and Development, 2019. *Principles on Artificial Intelligence*. Paris: OECD, [online] Available at: <<https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0449>> [Accessed 03 April 2021].



- Rana R.L., Giungato P., Tarabella A. and Tricase C. 2019. Blockchain applications and sustainability issues. *Amfiteatru Economic*, 21(Special Issue 13), pp.861-870.
- Standards Australia, 2020. *Final report. An Artificial Intelligence Standards Roadmap: Making Australia's Voice Heard*. [pdf] Available at: <[https://www.standards.org.au/getmedia/ede81912-55a2-4d8e-849f-9844993c3b9d/R\\_1515-An-Artificial-Intelligence-Standards-Roadmap-soft.pdf.aspx](https://www.standards.org.au/getmedia/ede81912-55a2-4d8e-849f-9844993c3b9d/R_1515-An-Artificial-Intelligence-Standards-Roadmap-soft.pdf.aspx)> [Accessed 03 April 2021].
- United Nations, 2015. *Transforming our world: the 2030 Agenda for Sustainable Development*, [online] Available at: <<https://sdgs.un.org/2030agenda>> [Accessed 03 April 2021].