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RESEARCH ARTICLE

Defining the Metaverse: A Systematic Literature Review

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ABSTRACT:

The term Metaverse is emerging as a result of the late push by multinational technology conglomerates and a recent surge of interest in Web 3.0, Blockchain, NFT, and Cryptocurrencies. From a scientific point of view, there is no definite consensus on what the Metaverse will be like. This paper collects, analyzes, and synthesizes scientific definitions and the accompanying major characteristics of the Metaverse using the methodology of a Systematic Literature Review (SLR). Two revised definitions for the Metaverse are presented, both condensing the key attributes, where the first one is rather simplistic holistic describing ''a three-dimensional online environment in which users represented by avatars interact with each other in virtual spaces decoupled from the real physical world''. In contrast, the second definition is specified in a more detailed manner in the paper and further discussed. These comprehensive definitions offer specialized and general scholars an application within and beyond the scientific context of the system science, information system science, computer science, and business informatics, by also introducing open research challenges. Furthermore, an outlook on the social, economic, and technical implications is given, and the preconditions that are necessary for a successful implementation are discussed.

INDEX TERMS: *Metaverse, virtual reality, augmented reality, immersion, virtual economy, blockchain, systematic literature review.*

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Introdução e Contexto

O artigo apresenta uma revisão sistemática da literatura sobre as definições do metaverso, um conceito que ganhou enorme popularidade após o *Facebook* mudar seu nome para *Meta* em 2021. Os autores Ritterbusch e Teichmann identificaram que não há consenso científico sobre o que o metaverso realmente representa.

"From a scientific point of view, there is no definite consensus on what the Metaverse will be like."

Tradução: "De um ponto de vista científico, não há consenso definitivo sobre como será o Metaverso."

Esta observação é fundamental, pois demonstra a necessidade da pesquisa. O artigo destaca que o termo "**metaverso**" originou-se no romance de ficção científica "**Snow Crash**" (1992) de Neal Stephenson, e desde então evoluiu consideravelmente.

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Metodologia

Os autores realizaram uma Revisão Sistemática da Literatura (SLR) seguindo o método de vom Brocke et al., analisando 381 publicações iniciais, das quais 28 foram selecionadas para análise detalhada após filtragem. A análise textual utilizou a biblioteca spaCy para Python para identificar as características mais frequentes nas definições existentes do metaverso.

"We examined the collected definitions and descriptions systematically following the definition analysis of Girard & Girard and then synthesized using word frequencies to answer RQ2."

Tradução: "Examinamos as definições e descrições coletadas sistematicamente seguindo a análise de definição de Girard & Girard e depois sintetizamos usando frequências de palavras para responder à RQ2."

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Principais Resultados

1. Definição Simplificada do Metaverso

Os autores propõem duas definições. A primeira é mais simplificada:

"Metaverse, a crossword of 'meta' (meaning transcendency) and 'universe', describes a three-dimensional online environment in which users represented by avatars interact with each other in virtual spaces decoupled from the real physical world."

Tradução: "Metaverso, uma combinação de 'meta' (significando transcendência) e 'universo', descreve um ambiente online tridimensional no qual usuários representados por avatares interagem entre si em espaços virtuais desacoplados do mundo físico real."

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2. Definição Expandida do Metaverso

A segunda definição é mais abrangente e incorpora mais características:

"Metaverse, a crossword of 'meta' (meaning transcendency) and 'universe', describes a (decentralized) three-dimensional online environment that is persistent and immersive, in which users represented by avatars can participate socially and economically with each other in a creative and collaborative manner in virtual spaces decoupled from the real physical world."

Tradução: "Metaverso, uma combinação de 'meta' (significando transcendência) e 'universo', descreve um ambiente online tridimensional (descentralizado) que é persistente e imersivo, no qual usuários representados por avatares podem participar social e economicamente uns com os outros de maneira criativa e colaborativa em espaços virtuais desacoplados do mundo físico real."

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3. Características-chave do Metaverso:

A análise identificou as características mais frequentemente mencionadas nas definições existentes:

- Ambiente tridimensional (three-dimensional);
- Representação por avatares (avatar);
- Interação entre usuários (interact);
- Espaços virtuais (virtual spaces);
- Desacoplamento do mundo físico (decoupled from the real physical world).

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Implicações Sociais e Econômicas

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O artigo destaca importantes implicações sociais:

"The use of customized avatars can thereby significantly reduce discrimination and thus act as a safe space for people with e.g., different skin color, gender, or social status in our physical world."

Tradução: "O uso de avatares personalizados pode, assim, reduzir significativamente a discriminação e, portanto, atuar como um espaço seguro para pessoas com, por exemplo, diferentes cores de pele, gênero ou status social em nosso mundo físico."

No aspecto econômico, os autores preveem impactos significativos:

"With the introduction of a unified Metaverse, this informational economy could reach a new level of escalation. The spatial (virtual) expansion of a yet unimaginable scale could result in a much larger economic and also social implication beyond what is tangible today."

Tradução: "Com a introdução de um Metaverso unificado, essa economia informacional poderia atingir um novo nível de escalonamento. A expansão espacial (virtual) de uma escala ainda inimaginável poderia resultar em implicações econômicas e sociais muito maiores além do que é tangível hoje."

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Desafios e Agenda de Pesquisa

O artigo identifica importantes desafios para o desenvolvimento do metaverso:

1. **Interoperabilidade**: Como integrar diferentes plataformas e tecnologias.
2. **Descentralização**: O papel da tecnologia blockchain e NFTs.
3. **Imersão**: Qual o nível de imersão necessário para uma experiência de metaverso.
4. **Regulamentação**: A necessidade de novas regras socioeconômicas para esse ambiente.

"It should be noted that there might not be a common consensus between the scientific and the corporate view of the Metaverse, which in turn opens new research questions."

Tradução: "Deve-se notar que pode não haver um consenso comum entre a visão científica e a corporativa do Metaverso, o que, por sua vez, abre novas questões de pesquisa."

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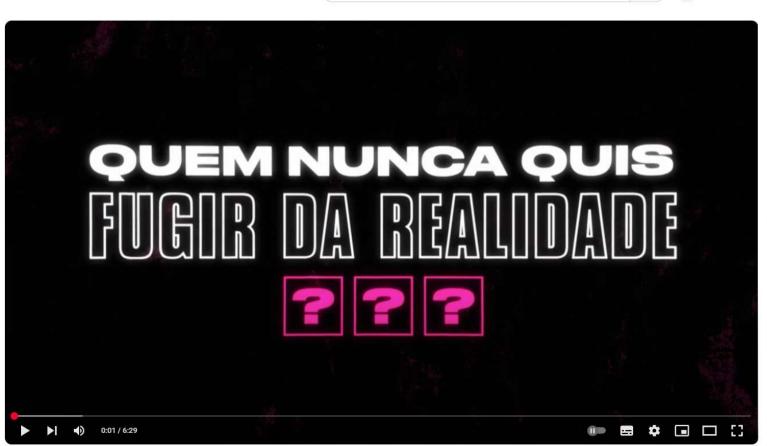
- **Conclusão**

  - O artigo oferece uma contribuição significativa ao campo ao propor definições abrangentes do metaverso baseadas em uma análise sistemática da literatura existente. Os autores reconhecem as limitações de seu estudo, incluindo possível subjetividade e a natureza em rápida evolução do campo tecnológico.

  - A definição e caracterização do metaverso propostas neste artigo fornecem uma base importante para pesquisas futuras e desenvolvimentos práticos nesta área emergente, que os autores projetam ter profundos impactos sociais, econômicos e técnicos na sociedade.

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Snow Crash e o metaverso

https://www.youtube.com/watch?v=K--quIH3EOY

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