Web 2.5 as a safe shift from Web 2.0 to Web 3.0: A definition of Web 2.5 in informatological approach

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Abstract

The blockchain ecosystem has undergone three distinct periods of exponential growth — the ICO boom of 2017, the Defi summer of 2020, and most recently the NFT wave of 2021.However, it was not yet seen a “web3-native” approach towards NFTs from any major brand. By that, we mean that no brand has upended its Web 2.0 architecture and replaced it entirely with a web3 stack. Instead, brands have taken a more measured approach, exploring NFT drops, integrations, and community growth developed separately from their core offerings. In short, brands have realized that Web 3.0 isn’t an ultimatum. They can explore emerging technologies like NFTs to both their benefit and that of their consumers without requiring immediate, all-in adoption. This phase can be described as Web 2.5. In this article, the author attempts to define what Web 2.5 is concerning informatology, along with identifying the potential future challenges of information management in this area and the new iteration of digital development, namely Web 3.0 or web3.

Keywords: Web3, Web 3.0, Web 2.0, Web 1.0, Web 2.5, Blockchain, Dapps, future, information science, definition, information management, LIS

Introduction

Nowadays, there have been numerous academic studies on the development of the World Wide Web and the Web 1.0 and Web 2.0 paradigms (Cormode & Krishnamurthy, 2008; Fuchs et al., 2010; Kollmann & Lomberg, 2010; Sykora, 2017; Zhao et al., 2015). With technological developments, the modern internet user may notice that we are in the midst of a paradigm shift towards what we call Web 3.0 or web3. This is a new form of utopian digital existence, also known as the decentralised web (Murray et al., 2022). This third iteration or generation, or Web 3.0, aims to allow users to get rid of intermediaries through blockchain, which in theory transfers full rights over the digital two to creators and artists. In this work, I would like to discuss in detail the transitional stage that has been observable in the digital space for more than five years now, a stage that I will refer to provisionally as Web 2.5. This work aims to present the definition of

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Web 2.5 in light of information science. The text consists of four sections: (1) a discussion of the state of research on the Web 1.0, and Web 2.0 paradigms, (2) a presentation of the components of Web 3.0, (3) a discussion of the Web 2.5 paradigm with a presentation of its definition, and a summary of the considerations and discussion in the context of a new research field for the information sciences.

Web 1.0, Web 2.0 & Web 3.0 - literature review

The World Wide Web was founded in the 1980s by Tim Berners-Lee (Divia & Berners-Lee, 1990; Surhone et al., 2010). Web 1.0 is a cognitive-technical-social system. Web 1.0 itself was an idea for a worldwide project based on a phenomenon called hypertext, that is - large collections of data held together by links. The idea of hypertext emerged in the field of literature in the 1980s, with the discovery of the literary potential of computers (Nelson, 2003). The navigation of the web journey, according to the project's assumptions, was to depend solely on the user, who shaped his or her journey through the successively discovered content, hidden under the links (Kollmann & Lomberg, 2010). Although the terms 'hypertext' and 'hyperliterature' are also used among texts of literary fiction, for example when describing Julio Cortázar's 1963 novel *The Class Game*, it was in that year that the term hypertext was introduced to refer to digital space (Castells, 2002). Tim Berners-Lee first used the term 'Web 1.0' in 1989. It was used to refer to the earliest version of the Internet, which emerged from the early days of the Defense Advanced Research Projects Agency (DARPA) (Clark, 1995; Perry et al., 1988). The World Wide Web is known as the first generation. Because people were only able to view the information provided by websites on a social level, this period is known as the 'Read-Only Web' (Nauman & Suorsa, 1998; Patel, 2013).

Web 1.0 was a computer network that met the needs of most site owners at the time. They needed a tool that would provide people, first and foremost, access to the published information at any time of day. Web 1.0 provided very little interaction where information could be shared, as it consisted mainly of web pages connected by hyperlinks, with no additional visuals, forms or images. This first generation was referred to as an information space where digital objects were described as resources identified by uniform resource identifiers (Friedman & Friedman, 2015). The role of Web 1.0 was thus very passive (Ricca & Tonella, 2003; Wu & Ackland, 2014) because everything was static and nothing hardly moved there.

An additional limitation that characterised first-generation Web sites was that their designs did not have content adapted to be read by indexing robots, or today's crawlers.

Nowadays, Google's indexing robot, for example, can "walk around" a page and read its content, which at the time was not even considered when creating the first web designs, due to the structure of the web. There was also a lack of dynamic representation of digital content and no tools to implement this idea (Bing, 2009; Elkin-Koren, 2000). Created by Martijn Koster at CERN in 1993, Aliweb was the world's first web search engine, allowing the first generation of Internet resources to be searched (Koster, 1994). Although it allowed early web users to index their sites using keywords and written descriptions, it never really became widespread among users and development ended in 2001. The late 1990s and early 2000s ushered in another phase in the development of the Internet, which is referred to in the literature as Web 2.0, the semantic web, or web2 (H. Fleischer, 2011; M. Fleischer, 2019; Radford & Wagner, 2000; Sixt, 2014).

At the outset, it is worth noting that there is no single conventional definition of Web 2.0. Like many technological concepts that came out of nowhere, Web 2.0 has essentially taken on a life of its own. Some consider the Web 2.0 era to be the time when a fundamental shift in the way we use the Internet took place (Fuchs et al., 2010; Ziegler, 2022). It can be described as a movement towards a more social, collaborative, interactive and responsive web. The Web 2.0 era has served as a marker for changes in the philosophy of web companies and web developers. Furthermore, Web 2.0 was a change in the philosophy of society as a whole. Both the change in the way society functions and the internet as an existing form of technology are part of Web 2.0 (Bao & Shang, 2021; França et al., 2021).

The term ‘Web 2.0’ was first officially used in 2004 by Dale Dougherty, vice president of O'Reilly Media Inc. (Ida, 2022). The phrase ‘Web 2’ first came into widespread use in 1999, when the Internet turned to a system that actively engaged the user, who became primarily a consumer of digital content - so that they could also post articles and comments, and it became possible to create user accounts on different sites, thereby increasing participation (Valtysson, 2010; Bizjak, 2012, 2020), which counterbalanced Internet use based only on browsing content. From the inception of the Internet to the Web 2.0 era, several technologies have redefined the World Wide Web, enabling a transformation from a static hypertextual model to a dynamic semantic one (Hendler, 2003; Hepp, 2006; Jackson, 2010; Maciąg, 2013, 2016; Sosińska-Kalata, 2005; Sycara & Mylopoulos, 2003).

The ideas that helped define the Web 2.0 era moved people online. A more social web has changed the way we think and do business (Horng, 2010; Nemer, 2016; Shang et

al., 2011; Stock, 2007).Features of Web 2.0 include folksonomy, a way of classifying information, e.g. by tagging images, websites or links; tagging enables users to find information in an organised way. We also have dynamic, interactive content and user participation, which helps the flow of information between the user's subject and the owner of a given site (Fleck & Kirchhoff, 2008; Gaweł, 2022, p. 22). Web 2.0 has several other features and techniques, known as SLATES, a term that was coined by Andrew McAfee. SLATES is an acronym for Search, Links to other websites, Authoring, Tags, Extensions and Signals (McAfee, 2006, pp. 23–25). Searching refers to finding content using keywords while linking to other sites refers to linking sources of information using a network model. Authoring refers to the collaboration of people who link their work, as well as commenting systems that allow people to share their views. Tagging refers to the categorisation of information, through one- or two-word phrases that help people search for specific keywords to find information. Extensions are used to make the Web an application platform and document server in one. Signals refer to the use of extension technologies such as RSS feeds. Web 2.0, because of its design and mechanisms based on user interaction, provided fertile ground for corporations to monopolise control and profits. Thus began the mass collection of data on centralised servers, which become one of the most popular among users. People sacrificed security for the convenience of these services; whether they knew it or not, their identities, browsing habits, searches and online shopping information were sold to the highest bidder (Carminati et al., 2013; Changchit & Bagchi, 2017; Chung, 2016; Fuchs et al., 2013; Herold, 2013; Oehri & Teufel, 2012; Oxley, 2013; Scaife, 2014; Shabahang et al., 2022). Since it has only been about 20 years since Web 2.0 was invented (1999) and less than the same amount of time since it was popularised (2004), one might think that there is still plenty of room for development in the Web 2.0 sphere, but we already have the beginning of the first digital forms in the new iteration of the Internet, otherwise known as Web3 or Web 3.0.

Web3 or Web 3.0 is the term used to describe a future internet built on decentralised blockchains, the ledger systems or registries currently used by cryptocurrencies. The essence of Web 3.0 is the transfer of the power of ownership (and profitability) from IT concerns and industry regulators into the hands of content creators (Kiong, 2022; Ma & Huang, 2022; Prusty, 2017; Ramamurthy, 2020). In a sense, we in society have become accustomed to trusting large corporations and big brands with our content and data and quickly realising that we don't own anything we create. Web 3.0 is not an upgrade of Web 2.0, it is a completely new technology package that needs to be invented and

refined from scratch. Web 3.0 consists of three layers: Smart Contracts, Blockchains and Decentralised Applications, collectively known as ‘DApps’. In summary, blockchains are distinguished by their different architectures but are ultimately based on the premise that they are available to users (depending on whether they are private or public) and cannot be rewritten, forged or counterfeited. Smart contracts are programs run on the blockchain that run when predefined conditions are met. DApps are an alternative to traditional applications, decentralised or built on blockchains (Abdullah & Yihan, 2022; Infante, 2019; Korpal & Scott, n.d.; Kraus et al., 2019; Rius & De Molina Rius, 2022; Rudanko, 2021; Taulli, 2022; Voss & Gregory Voss, 2021; Yuan, 2019). Web 3.0 is an inclusive set of protocols designed to provide building blocks for application developers. These building blocks take the place of traditional web technologies such as HTTP, AJAX and MySQL, but present an entirely new way of creating applications(Catarci et al., 2022; Ito, 2022; Welpe, 2022). These technologies give the user strong and verifiable guarantees about the information they receive, what information they give away, as well as how much they pay and what they receive in return. By empowering users to act independently within low-barrier markets, users can ensure that censorship and monopolisation have fewer places to hide.

Web 2.5 - a conceptual definition from an information science perspective

The concept of Web 2.5 is not new. Already at the beginning of 2010, there were articles describing phenomena heralding a new transitional phase between Web 2.0 and Web 3.0 (Bernal, 2010; Pileggi et al., 2012). This is a conventionally recognised chapter in the development of the information infrastructure, which is a prelude to Web 3.0. Unlike the transition from Web1.0 to Web 2.0, which mainly consisted of a move from read-only websites to the more interactive websites or social, user experience-focused web we have now, the leap from Web2 to Web3 is much more complicated. The concept of Web 3.0 was created by Ethereum co-founder Gavin Wood in 2014. This results in a state where shifting the balance of power for all of them is not an easy task, if only from a technological point of view. For there to be a rapid metamorphosis of the internet into the Web 3.0 phase, there must be enough mass participation by web users and widespread acceptance of the new third-generation technology. In other words, there is not enough adaptation of the technology and there is also a lack of engineers and blockchain developers to implement this transformation. There is a long way to go for Web3 to reach maturity and for developers to build a compatible technology package to redefine

the web in the new digital reality. Therefore, some stops are needed, filled with innovations that are not too overwhelming and alienating for the average user, that will act as a smooth transition from one generation to the next. Web 2.0 established a model for development and promotion based on social marketing, relying on the participation of digital users in social media, while Web 3.0 offers appealing benefits, but not without volatility, which may cause fear of the unknown, economic risks and a lack of understanding of how Web 3.0 works (Broustail, 2022; Longshak, 2022). This is why today's leading brands are taking a cautious approach to use the potential of Web 3.0, as it is important to first learn about the opinions and information and economic behaviour of consumers in this market.

To this day, the research literature lacks a coherent and universally accepted proposal for a definition of Web 2.5. As it is the next stage in the development of the computer network, it is also closely related to the development of the information network. An important feature of the proposed definition is the integration of elements such as information management and information architecture in such a way that a complete definition of the phenomenon can be created. Nowadays, any adaptation of the resources of Web 3.0 technology is based on its implementation into the already existing Web 2.0 infrastructure - which can form the basis for designing a definition of Web 2.5.

For the benefit of informatology, which soon is also likely to use digital resources in the third-generation space as part of information management, I propose the following definition of Web 2.5: *Web 2.5 is a transitional stage in the development of the computer web, which consists of the implementation of new principles of information and digital resource management, allowing a smooth transition to a new iteration of the third generation of the digital environment (Web3). It involves redefining contemporarily recognised principles of information management and information ownership itself to adapt to the ongoing changes in the digital environment, which are moving away from centralisation towards decentralised structures*. Following this line of reasoning, the reader will note two main problems with this definition: The first is to establish how the assumptions of Web 3.0 change the properties of information to be able to use this in the adaptive process of Web 2.5. The second problem is the issue of information management in the new iteration of the digital web. Information, as envisioned by Web 3.0, is the overarching value and driver of the entire web infrastructure. Information in the blockchain is optimised to be stored in serialised blocks, saving one block at a time as the chain is created. These serialised blocks store information about fundamental

parts such as transactions, accounts and contracts. The nature of blockchain is that it must be deterministic. The essential feature of a blockchain is that it has knowledge of the state in a given block (or unit of time). This means that, for example, a user can invoke a smart contract for a particular block, and the blockchain guarantees that its execution will always produce the same result for the same block every time it is invoked. Additionally, each block contains a copy of the previous block, which verifies the authenticity of the data. To access data on a blockchain, one must first become an authorised user of such a system. To have full access to the data stored on a given blockchain, one must also use a reward token offered by the platform or currency in question. The purpose of this token is to encourage increased usage of the system in question while ensuring trust in its integrity and security.

Anyone on the network has permission to use the services and services available but does not own the service as an entity. In addition to the shared ecosystem, the aforementioned blockchains act as databases that store records while algorithmically ensuring the security, integrity and authenticity of the information. When considering the ownership of information, blockchain is a permissionless, borderless and censorship-resistant technology that operates through a global network of computers called nodes. This means that anyone can benefit from proof of blockchain ownership regardless of age, religion, status or location. A single node on the blockchain cannot act as a gatekeeper and take control of the data. Transactions in the blockchain's master registry are stored in a permanent and verifiable manner. Users who store information using the blockchain retain access to it through encryption keys, regardless of the service or application that generated it.

The second problem, related to the management of information in the new digital space, is related to the skeleton of the new information management model that is currently taking shape, as the full responsibility for the information is assumed by its owner. Hence, the information management model in Web 3.0 will certainly be simplified, if only in terms of a reduced number of operational activities on the data. Some aspects will remain the same, such as the management of information resources versus the management of information processes, but some operations will be transformed due to the new properties of information. Hence, in informal logical terms, the Web 2.5 stage is a key moment for the information environment to scientifically subject this research area to study, as it is new and contains many gaps as well as promises that may become the domain of action for the information professionals of the future. Today, Web 3.0 is mainly

being adopted by IT professionals, cryptocurrency enthusiasts and early adopters seeking to improve the industry. This represents a paradox, as one of the main criteria for the transition to Web 3.0. is universal accessibility. A second reason is the immaturity of the IT industry and the lack of legislation. With the growth of digital assets, it has become necessary to update legislation to protect the property rights of content creators, game characters and cryptocurrency assets. From a technological point of view, the NFT has solved the ownership problem. However, there is still no consensus on their legality among national and international governments to align them with the new regulatory mechanisms. The third problem is the mismatch between the goals of Web 3.0 and the economic interests of the stakeholders who created the modern centralised Internet. Web 3.0 eliminates the main mechanisms for monetising business. This is at odds with the ambitions of governments and corporations to de-anonymise Internet users as much as possible. It is worth considering why governments want to track cryptocurrency transactions, knowing who is behind the address of the wallet, and therefore post-anonymity. The underlying issue is how quickly the market can change. Now, content is created primarily from the budgets of advertisers, for whom IT giants collect data.

Changing the mentality, getting into the habit of paying oneself for the development of each step and being responsible for one's data may take decades. Thus, we are still at a stage where we do not trust ourselves with our data. Handing them over to an IT giant to manage and pay for this development means that we abandon the rest of the responsibility for maintaining them and are not entirely responsible if they are faked or lost.

Summary

The fact is that the redevelopment of the web is more about culture, education and popularisation than about specific IT solutions. These informatics solutions will continue to be debated for years to come, such as which technologies will be critical or able to shape the development of the Internet, and we still won't settle. In doing media research, I have noticed that Web 2.0 is primarily focused on the consumer, but it is Web3 that is actually based on information and community. Web 3.0 will still, in 2022, have to work out how best to reach users, and while this is happening, our work will be based on the infrastructure of Web 2.5 - built using Web 3.0 technologies, ultimately blockchain applications, but using the familiar infrastructure from Web 2.0. Web 2.5 is a new iteration of the internet that tries to give more power to creators. It is important to

remember that Web 2.5 is currently an intermediate point on the timeline of Internet development, not its ultimate goal. Just as Web 2.0 did not automatically extinguish Web 1.0 (still gathering dust in some corners of the Internet), the transition to 3.0 will take time and integration with existing online systems, and the current stage of Web 2.5 provides a safe haven for the adaptation of both the web infrastructure and the new information competencies that may be necessary to function at full value in the new digital space.

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