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Evolution Of Web Technologies in Recent Years

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***Abstract*- The development of web technologies in recent years has been characterized by a multiplicity of technical breakthroughs and paradigm changes, which has resulted in a highly dynamic and complex ecosystem. In recent years, web technologies have been defined by a number of technological advancements and paradigm shifts. This review paper aims to evaluate the most significant trends, challenges, and opportunities that have shaped web development over the past decade, ranging from the rise of mobile-first design and responsive web development to the emergence of progressive web apps, single-page applications, and serverless architecture. Specifically, this paper will focus on how mobile-first design and responsive web development have shaped web development. This review paper offers a detailed perspective of the present status of web technologies and its implications for future innovation and development by conducting an exhaustive examination of the most recent research and industry practices. In conclusion, this analysis sheds light on the vital part that web technologies play in the formation of the digital environment and offers guidance to developers on how to successfully traverse the ever-evolving online ecosystem in order to create web applications that are resilient, scalable, and centered on the needs of end users.**

Keywords-Machine Learning, Artificial Intelligence, Web technology, Semantic web, World Wide Web, Web, Web Platforms.

I. INTRODUCTION

Up until quite recently, it was believed that the sole use of web technologies was the creation of websites and web pages for use on the internet and intranets. Despite the fact that we now live in a mobile age, it is still true that web-based applications are more productive than their app-based counterparts.

In addition to this, there is a large number of progressive web applications that function in the same way as mobile apps. Because of this, web applications will unquestionably be there for a very long time to come. The fact that these online applications make use of cutting-edge scalable technologies — or, to put it another way, make use of state-of-the-art quality stack technology — is what makes investments in them valuable. The most suitable technological stack may also optimize the performance of the application while simultaneously increasing corporate penetration. Taking into account the progression of web technology, new capabilities and possibilities have emerged at each step of growth. The mechanism by which these advancements are being developed also shifts and adapts as the connection between the concept of the internet and its users evolves.

British scientist Tim Berners-Lee created the World Wide Web in 1989 when he was working at CERN. The initial objective of the Web's development was to meet the automated information-sharing demands of academics from institutions and other worldwide organizations.

Later, as a more trustworthy method of extending its reach, CERN made a release accessible under an open license. These activities led to the creation of the web. Additionally, it was claimed that "the development of interactive new Web applications," which people are attempting to do with their growing technological proficiency, examines enormous amounts of data [1]. As a result, the Hypertext Markup Language (HTML) was developed in 1990. The World Wide Web's primary building block, HTML, was built heavily on the Standard Generalised Markup Language (SGML), and it continues to be the backbone of its code and infrastructure. The standard gave programmers the ability to arrange web page layouts such that they could be interpreted and used across connected networks.

The Internet has since changed society for the better. It is currently the most successful means of communication there has ever been, most people would agree. The Web has altered how we study and teach, exchange goods and services, receive and impart information, agree and disagree, share and work together, meet and fall in love, and address issues like putting food on our tables and curing cancer. Even though just 25% of the world's

population currently uses the Internet (and the Web Foundation aims to dramatically speed up this growth), the Web has altered these facets of our life.

Users could only view material and provide a little amount of information because Web 1.0 was essentially the first web paradigm. The first learning network for developing HTML-based web pages was this one. It is then actively used as an integrated network for engagement and communication in Web 2.0 and Web 3.0. The fourth generation of Web technology, known as Web 4.0—also known as the ultra-intelligent Web—combines a number of technologies. Thoughts concerning how Web 4.0 technology will work are rather widespread, despite the reality that there isn't a definitive study of it or an accurate explanation of how it will function in the available literature [2].

The importance of Web 4.0 will rise between 2023 and 2033. It is linked to four different technologies, including big data, communications, the Internet of Things, artificial intelligence, nanotechnology, and automation interfaces [3].

The Web 4.0 generation is taking shape, and its goal is to be an all-encompassing technology that combines the finest features of Web 2.0 and Web 3.0. It is claimed that computer users would have access to robust technology that communicates and transacts with the web environment in an intelligent way [4-5]. Given the constant expansion of communication and information channels, it is essential that the Web world develop traits that could help it reach these objectives. Web 4.0 is therefore anticipated to be a space where significant communities can collaborate in the business, political, social, and other spheres of life by granting them access to key audiences and enabling their participation in online systems that offer global oversight, transparency, and distribution systems. In this sense, Web 4.0 is a symbiotic network where data exchanges take place between users, smart devices, and the Internet of Things.

In relation to this study, a survey of the literature on Web 4.0, the most advanced web technology with intelligent and highly interactive features, was provided. It includes innovations and features that it would later introduce to the Web. By elucidating a variety of viewpoints on what Web 4.0 is or might be, this article also seeks to analyze the scope of this technology.

II.OVERVIEW

Towards the end of the 20th century, algorithms for machines and computers developed quickly. They play many different roles in modern life and represent a technological revolution. The concept of machine intelligence, or "Thinking machines," was first proposed by Alan Turing and is now the cornerstone of the increasingly important subject of artificial intelligence (AI) [6]. The Turing Test, developed in 1950, marked a significant advancement by checking if a machine has the ability to think intellectually on par with or equal to that of a person [7].

The data collected from the Web will be rationally digested and made meaningful. The development of smarter web environments will enable the application of AI technology's capabilities to facilitate web mining. The creation and application of features made possible by advancements in AI and it's related **Web 3.0**-is the foundation of the intelligent Web revolution 4.0, which is based on a variety of perspectives and ideas. Through an internet-connected gadget, a user can share information using the web as a global database. Numerous materials demonstrate the stages of the development of Web technology, showing how, as it gets simpler for users, it gets more difficult for developers. The web has both basic and sophisticated architecture. The first version of the web, known as Web 1.0, was created before 50 years had passed. The most recent version is known as Semantic Web [8].

Web 1.0-The World Wide Web, which Tim Berners-Lee invented and which is still in use today, is illustrated by this. It is merely a readable website that houses the World Wide Web's unprocessed data. The user is only permitted to use the browser to browse and read material; he is not permitted to share or recommend the website. Consequently, it is static (fixed) information. In contrast to a large number of users who do not need to understand how websites are constructed, a limited number of persons who need to understand how websites are generated (interlinked) can create and edit websites in Web 1.0.

Additional protocols used by Web 1.0 were XML, XHTML, and CSS. Between the server and the user, there are numerous technologies connected to one another, like PHP, CGI, JSP, and ASP. The server side on the client makes use of JavaScript, VBScript, and Flash. Every time new content is added, The user has to refresh the website because the first version of the web is so slow. The problem with Web 1.0 only works in one direction. In other words, the user is not permitted to post or edit the website [9].

Fig. 1- Web 1.0

Web 2.0-Dale Dougherty, who was vice president of O'Reilly at the time, coined the term "Web 2.0" at a conference with Media Live in 2004. Internet usage advantages are described in Web 2.0 [10]. The Web is referred to as becoming interactive in the computer industry so that more 22 people may develop apps using the network's infrastructure. When the Web started to gain popularity in 2004, the term "Web 2.0" was first used. A user-centric and collaborative environment has been made possible by Web 2.0.As a result, web 2.0 environments are now far more often used. Internet users have access to a platform where numerous

sharing activities, including the creation of music, files, images, and movies, are conducted. Information flow is provided by an independent platform within the Web 2.0 architecture, referred regarded as the "backbone of the internet," with authorizations from online databases using the standardized XML (Extensible Markup Language) tag language.

It is accessible to query the data that is present across various systems as well as data flows that are active with different internet sources, such as XML, with the aid of the Really Simple Syndication/Rich Site Summary Web page declarator. Online 2.0 is often referred to as a user-focused, read-write online network. Web 2.0 users have largely abandoned the controls they were used to using in favor of a platform that encourages greater user interaction.

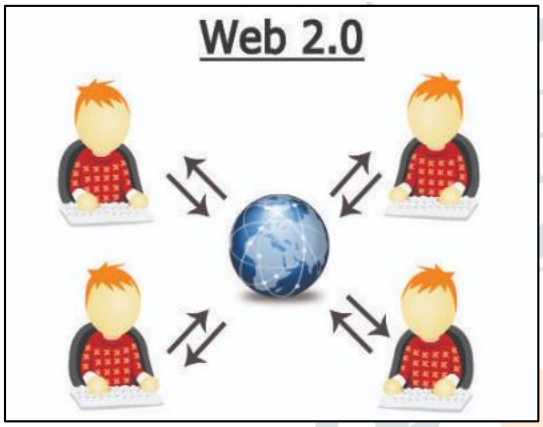

Fig.2-Web 2.0

Web 3.0-It is the third and current version of the web, commonly referred to as executable web, and it was released in 2014 and provides users with access to dynamic apps. In other words, personalization and the Semantic Web are sometimes used interchangeably. The web will be completely redesigned in Web 3.0. The goal of Conrad Wolfram's Web 3.0 idea is to replace people with computers that are more intelligent and capable of thought. A new technique called Web 3.0 is being adopted in several online industries. Alternatively, turn the web into a sizable database. The idea behind Web 3.0 is to have computers describe precise information at a fast rate of speed while providing the user with the information's meaning so they don't have to keep looking up the same words online [11].

Based on user preferences, history, and interests, internet searches will be adjusted and improved. All data and information on the internet must have descriptions, thanks to Web 3.0. The integration of metadata and content is the aim of the new web technologies. Web 3.0 is sometimes referred to as the "smart Web" by authors because it offers more functionality than just traditional search engines. Internet users have the ability to organize and customize how they navigate the Web to suit their preferences. Identifying data sources, enabling their connection to one another for enhanced efficiency, and facilitating the creation of user profiles are the core ideas behind Web 3.0.

It incorporates and analyses data from many datasets into its content to generate new information flows, enhance data management, boost user pleasure, and guarantee collaboration on social networks. With Web 3.0, significant strides have been achieved in the production of big data, which is now sought after by many institutions, in increasing user satisfaction, and in collecting information to meet their demands. Several companies take advantage of the possibilities offered by this innovation in their decision-making stages because the data in the data stores were produced in accordance with consumer requests with the aid of Web technologies. Big data analysis using AI and fuzzy logic, often known as Web 3.0, has been approved. Google, which is the Web 3.0 technical infrastructure, is one example of Web 3.0 [11].

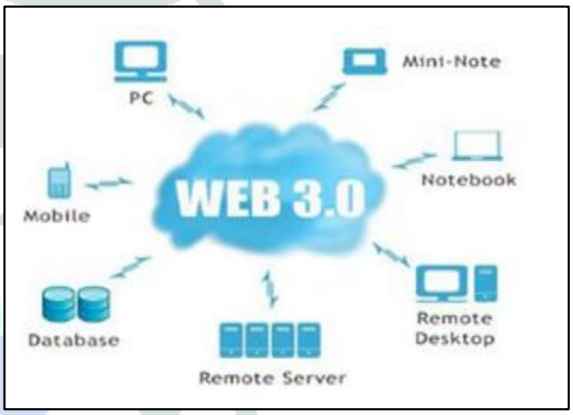

Fig.3-Web 3.0

The semantic web's organizational structure is best illustrated by one of its layers, sometimes known as the "semantic web cake." The stack of technologies used to construct it shows how they were ordered and standardized to make the semantic web a reality. The semantic web is a representation of language. To put it another way, the semantic web stack shows that the semantic web is an extraction of the traditional hypertext web and not a brand-new technology. While still in progress, many websites offer this capability, such as Secondlife.com, allowing users to construct 3D objects and control animation using 3D graphics tools or programs. The layers of Web 3.0 exist, however, not all of them have been utilized up to this point. Web 3.0 has numerous capabilities, but it also has a number of drawbacks. For example, it is harder to construct an intelligent web because it requires more web design expertise from the provider, it is harder to identify a user's ID on the web, and there are more client requests going to the server.

The main difference between Web 2.0 and Web 3.0 is that Web 2.0 emphasizes user and producer content innovation whereas Web 3.0 emphasizes linked data sets. In Table 1, the differences between Web 2.0 and Web 3.0 are contrasted.

Table1: Comparison between Web 2.0 and Web3.0-

Web 2.0	Web 3.0
The Social Web	The Semantic Web
Read and Write Only	Read, Write and executes
Interaction	Immersion
Web Application	Smart Application
Connect People	Connect context, people, and knowledge
XML/RSS	RDF/RDFS/OWL
Wikipedia	Sematic Web

For the semantic web, Tim Berners-Lee proposed a layered design., featuring numerous changes since.

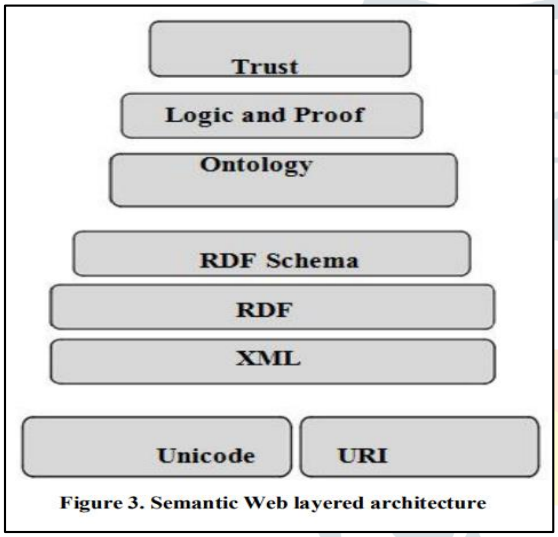

Figure 3. Semantic Web layered architecture

Following is a brief description of each layer of the semantic web architecture:

Unicode and URI-While URIs are used as global identifiers for all kinds of resources, Unicode is used to represent any character in a unique way independent of how it was written in any language. The capabilities of Unicode and URI allow for the provision of an individual identification mechanism for the semantic web's components within the language stack.

Extensible Markup Language is another name for it. Without requiring any interaction between the concepts of the data, XML is used to create a standard way to format data on the internet. Namespaces (NS) and schemas are related standards. Other technologies created for the higher layers of the semantic web use XML as their foundation syntax. NS is used to recognize and categorize various XML elements from various vocabularies. It makes it possible to put together several pieces from various languages in order to complete a certain goal. When two apps at this level communicate data with one another, XML schema makes it possible to guarantee that the information received matches the information provided.

The Resource Description Framework known as RDF. It is a straightforward data model that uses URIs to identify web-based resources and names attributes and values to express relationships between the resources. Semantic interoperability is generally supported by the RDF family. The base web language is a component of RDF developments, enabling agents to draw conclusions based on metadata in order to carry out tasks.

The Resource Description Foundation is the standard foundation for describing any online resource, including web pages and web content. The resource's creators can be identified by the Resource Description Foundation, data production, or modification. The information that is found through keyword searches is connected to subject-specific data groups or categories. Every user can easily share websites and descriptions with additional intelligence agents thanks to the RDF framework. On the other hand, the World Wide Consortium (W3C) developed RDF as an application for XML, another technology. Is it the model that the website used to share data? RDF has various capabilities that allow data to be combined even when the fundamental schemas are different. There are a number of RDF-related technologies, but the most recent ones are Apache Jena, Mobi, FRED, Outdated-ARC RDF Store, and Outdated-Adobe's XML. The structure of subclasses and attributes in the RDF is substantially more condensed than it is in the OWL.

Resource Description Framework Schema (RDFS) is a collection of classes that employ RDF extendable knowledge to express a model of data and the fundamental components needed for ontology descriptions. It is also known as RDF vocabulary. These vocabularies are intended to organize the RDF resources that are stored in triple stores for SPARQL query access. Some classes in the RDFS define the resources of the class and subclass, just like classes in OOP languages. When words are specified in RDF, the RDFS language is frequently used to define the main classes and types. It is also occasionally used to provide certain properties for other resources. like a property's range or domain.

In semantic webs, the WOL language is used to depict the connections between various complex knowledge of objects or collections of things. The OWL is one of the simple-to-learn computational logic languages. Online access to the OWL documents used to be provided. The W3C's Semantic Web Technology stack, which also consists of RDF, SPARQL, and RDFS, incorporates the OWL as one of its components. The W3C OWL work group produced the most recent OWL version, commonly referred to as OWL2, which was released in 2009. and the second edition's publication in 2014. The OWL includes tools like Apache Jane, Mobi, FRED, Graph DB, and Openlink Virtuoso, among others. OWL's primary grammar was reliant on XML, RDF, and RDFS.

Logic and Proof-The logical structure is layered on on top of this, which enables an autonomous reasoning engine to reach new

conclusions. The agents can determine whether various resources meet their wants by using these thinking processes[11].

The semantic web is about creating linkages to connect relevant material, not only publishing stuff online. In 2007, Berners-Lee developed a set of rules known as the Linked Data guidelines to help distribute and interconnect data on the web.

Give items URIs as names, To check up on such names, use HTTP URIs, Offer helpful information by looking up a URI utilizing the standards (RDF, SPARQL), Add connections to further URIs so visitors can learn more ,By sharing their data on the web in accordance with the Linked Data rules, data suppliers can contribute their information to a single, global database space.

Web 4.0- Web 4.0, also referred to as the latest version of the Internet or Web 4.0, stands out for its more cooperative and participatory method of web development. Applications for Web 4.0 are made to be easier to use and make it possible for users to share information and ideas. Web 4.0 apps including social networking sites, blogs, wikis, and video-sharing websites are among the most well-liked. With Web 4.0, traditional web development techniques are being replaced with a more collaborative and user-centered methodology.

Web 4.0 is the most recent edition of the global web, and promises to be even more interactive and user-friendly than its predecessors. What precisely is Web 4.0, then?

In a word, the main goals of the fourth generation of the web are to increase the web's usability and engagement. This involves refining web pages to make them easier to navigate and understand as well as including features that allow users to interact with one another and the page's content. Podcasts, blogs, wikis, and social networking are some of Web 4.0's most well-liked features. These characteristics make it easier for users to connect with one another and share information.

One of Internet 4.0's goals is to increase everyone's access to the Internet. Included in this are people who are disabled and can use assistive technologies to gain easier access to web content. The technology known as Web 4.0 is still in its early stages, yet it has already had a big impact on how we use the World Wide Web. The online environment will likely undergo further changes as time goes on to make it even more dynamic and user-friendly than it already is.

III BRAIN-COMPUTER INTERFACES(BCIs)

Through the use of brain-computer interfaces (BCIs), people can communicate with computers by utilising their thoughts. BCIs measure brain activity and translate it into commands that computers can understand. Though they are still in the early phases of development, BCIs have the power to completely alter how we interact with technology. BCIs could be applied in a variety of contexts, such as communication, prosthetic device control, and even entertainment. BCIs have enormous potential for assisting those with disabilities and for improving general human-computer interaction.

The Metaverse-A virtual environment called the metaverse is produced through the interactions of many online communities and individuals. It is a 3D environment that anyone with an internet connection can access. As more individuals join and contribute new content, the metaverse continues to grow and change.

Numerous uses for the metaverse exist, including social networking, gaming, learning, and commerce. It offers a distinctive method for interacting with both real people and fictional characters and objects created by computers. The way we relate to one another and our surroundings could be completely transformed by the metaverse.

IV ARTIFICIAL INTELLIGENCE

The field of artificial intelligence (AI), a discipline of computer science, aims at creating intelligent, self-aware devices. How to build computers with the ability to behave intelligently is the subject of AI research. Applications of artificial intelligence can be used to carry out tasks that are challenging or impossible for people to complete, such as comprehending natural language or identifying things. Healthcare, banking, and manufacturing are just a few of the industries using AI technology today.

As artificial intelligence (AI) permeates more and more facets of our lives, it is conceivable that AI will have an even greater impact on society in the future.

The Internet Of Things-The Internet of Things, or IoT as it is frequently abbreviated, is an interconnected collection of actual physical objects like automobiles, appliances, and other home items that are outfitted with electronics, software, sensors, and networking technologies that enable them to connect and exchange data. The Internet of Things is altering the way we work, play, and live.

Our daily lives are already significantly affected by the Internet of Things. As an illustration, a lot of us now use wearable technology, such as fitness trackers and smartwatches, to record information about our levels of activity and sleeping habits. Our cellphones or computers get this data, which we may access and utilise to alter our lifestyles. As more devices are networked together in the future, the Internet of Things (IoT) will spread even farther. By 2030, the Internet of Things is predicted to have more than 50 billion linked devices. Businesses and people will both benefit greatly from these new prospects.

The World Wide Web is now in its fourth generation, or Web 4.0. Increased user contact, teamwork, and seamless integration of the real and virtual worlds are its defining characteristics. Web 4.0 characteristics include mashups, social networking, blogs, wikis, folksonomies, and user-generated content.

We require Web 4.0 because it improves our ability to connect with one another, which is one of the key reasons. It's crucial to be able to connect with people online in order to develop relationships and create communities in a world that is getting more and more digital. More individualised experiences are also possible with Web 4.0. We are able to design experiences that are personalised for us because to increasing user involvement and collaboration. Finding new music or learning about other civilizations are both examples of this [12].

Fig.5-Web 4.0

V CHALLENGES

The World Wide Web has advanced to version 4.0, which has the potential to be much more revolutionary than earlier versions. But like with any new technology, there will always be some difficulties to be solved. Security is one of Web 4.0's main problems. There is a higher risk of identity theft and other cybercrimes as more and more personal data is being stored online. Additionally, we run the risk of losing our privacy as the Internet gets more and more incorporated into our daily lives.

Scalability will be another issue that Web 4.0 will have to deal with. It will become more challenging to meet demand as the number of devices and users connected to the Internet rises. Everyone engaged may experience slower connection speeds and greater latency as a result.

Accessibility is a further difficulty that Web 4.0 will encounter. People without a lot of technical understanding will find it more challenging to use technology as it advances. A digital divide between those who can use all the new features and those who can't could result from this.

VI CONCLUSION

In this work, a summary of web technologies was provided. This study recognized three web generations: the first generation of the web, the second generation, the third generation of the web, and Web 4.0. The characteristics of the generations are introduced and compared. The conclusion that can be drawn is that the web has developed greatly as an outlet for information since 1989 and is on course to soon employ computational intelligence methods and develop into a network of highly intelligent interactions.

As the web has evolved over time, it has become clear that the fundamental web—which had only a few tools and controls—is becoming a vast intelligent storehouse of information. Additionally, it has grown simpler for all types of users because they no longer need to know more about communication technology in order to utilise the internet. It is also incredibly convenient for searching for any information we may have in mind because we can access millions of websites in a matter of milliseconds.

The semantic web, which is the current version of the web, will soon function like a person while searching for information; it will be incredibly user-friendly yet complex for developers.

Even today, some semantic web levels are still evolving and not yet standardised. When we search for information online, the web first considers what is in our minds and understands the user rather than searching by keywords. In the future, I believe the web will become more like humans. In this respect, the web will be smarter than people.

REFERENCES

[1] Tim Berners-Lee, ―The World Wide Web: A very short personal history‖, http://www.w3.org/People/BernersLee/ShortHistory.html , 1998.

[2] Sareh Aghaei, Mohammad Ali Nematbakhsh and Hadi Khosravi Farsani ,“Evolution of The World Wide Web:From Web 1.0 to Web 4.0”,International Journal of Web & Semantic Technology (IJWesT) Vol.3, No.1, January 2012

[3] M. A. Sadeeq, S. R. Zeebaree, R. Qashi, S. H. Ahmed, and K. Jacksi, “Internet of Things security: a survey,” 2018, pp. 162–166.

[4] M. Parvathi and R. Mariselvi, “A bird’s eye on the evolution–Web 1.0 to Web 5.0: Lib 1.0 to Lib 5.0,” Int. J. Adv. Res. Trends Eng. Technol., vol. 4, no. 4, pp. 167–76, 2017.

[5] R. R. Zebari, S. Zeebaree, K. Jacksi, and H. M. Shukur, “E-business requirements for flexibility and implementation enterprise system: A review,” Int. J. Sci. Technol. Res., vol. 8, no. 11, pp. 655–660, 2019

[6] Kordon, Applying computational intelligence: how to create value. Springer Science & Business Media, 2009.

[7] J. Howard, "Artificial intelligence: Implications for the future of work," Am. J. Ind. Med., vol. 62, no. 11, pp. 917–926, 2019.

[8] [DU,XIAOFENG (2009), Semantic Service Description Framework For E-cient Service Discovery and Composition, Durhamtheses, Durham University. Available At Durham.

[9] Aghaei, S., Nematbakhsh, M. and Farsani, H. (2012). Evolution of the World Wide Web : From Web 1.0 to Web 4.0. International journal of Web & Semantic Technology, 3(1), pp.1- 10.

[10] Choudhury, N. (2014). World Wide Web and Its Journey from Web 1.0 to Web 4.0. International Journal of Computer Science and Information Technologies

[11] Technology,Altenbergerstrabe69,4020Linz,Austria,http://www.fim.unilinz.ac.at/lva/SE_Netzwerke_und_Sicherheit_Security_Considerations_in_Intercon_Networks/se mH pdf/.

[12] https://www.linkedin.com/pulse/web-40-explained-brief-agiledistrict/

[13] K. Nath and R. Iswary, "What comes after Web 3.0? Web 4.0 and the Future," in Proceedings of the International Conference and Communication System (I3CS'15), Shillong, India, 2015, pp. 337–341.

[14] Abbott, R. (2010). Delivering quality-evaluated healthcare information in the era of Web 2.0: design implications for Intute: Health and Life Sciences. Health Informatics Journal, 16 (1), 5–14.

[15] Abel, F., Frank, M., Henze, N., Krause, D., Plappert, D., & Siehndel, P. (2007). GroupMe! – Where Semantic Web meets Web 2.0.Aharony, N. (2009). The influence of LIS students' personality characteristics on their perceptions towards Web 2.0 use. Journal of Librarianship and Information Science, 41 (4), 227–242.

[16] Anderson, P. (2007), What is Web 2.0?Ideas, technologies and implications for education, pp 2- 12

[17] Anderson, P. (2007). `All That Glisters Is Not Gold' -- Web 2.0 And The Librarian. Journal of Librarianship and Information Science, 39 (4), 195–198.

[18] Ankolekar, A., Krötzsch, M., Tran, T., & Vrandecic, D. (2007). The Two Cultures: Mashing up Web2.0 and the Semantic Web. (pp. 825-834). World Wide Web Conference Committee.

[19] Blas, N. D., Garzotto, F., & Poggi, C. (2009). Web Engineering at the Frontier of the Web 2.0: Design Patterns for Online 3D Shared Spaces. World Wide Web, 12, 345–379.Blum, N., Linner, D., Krüssel, S., Magedanz, T., & Steglich, S. (2008). Definition of a Web 2.0Gateway for 3rd Party Service Access to Next Generation Networks. Boston: Springer.

[20] Bojars, U., Breslin, J., Finn, A., & Decker, S. (2008). Using the Semantic Web for linking and re usingdata across Web 2.0 communities. Web Semantics: Science, Services and Agents on the World Wide Web, 21–28.

[21] Boulakfouf, S., & Zampunieris, D. (2008). Integrating Web 2.0 Features into a Learning Management System. Paper presented at the 7th European Conference on e-Learning (ECEL'08), (pp. 127-133). Cyprus.

[22] Boulos, M. N. K., & Wheeler, S. (2007). The emerging Web 2.0 social software: An enabling suite of sociable technologies in health and health care education. Health Information and Libraries Journal, 24(1), 2-23.

[23] Boyer, J. M. (2008). Interactive Office Documents: A New Face for Web 2.0 Applications. São Paulo: DocEng‟.

[24] Chadwick-Dias, A., Bergel, M., & Tullis, T. S. (2007). Senior Surfers 2.0: A Re-examination of the Older Web User and the Dynamic Web. C. Stephanidis (Ed.): Universal Access in HCI, 868–876.

[25] Chan, C. K., Lee, Y. C., & Lin, V. (2009). Harnessing Web 2.0 for Collaborative Learning.

[26] Hendler, J. (2008). Web 3.0: Chicken Farms on the Semantic Web. Web Technologies , 106-108.

[27] Hoegg, R., Martignoni, R., Meckel, M., & Stanoevska-Slabeva, K. (2006). Overview of business models for Web 2.0 communities. Dresden.

[28] Hsieh, M.-C., Kao, Y.-W., Hsieh, S.-L., & Yuan, S.-M. (2008). Web 2.0 Proxy: A New Framework for Web 2.0 Website Development. 7th Wseas Int. Conf. on Telecommunications and Informatics, (pp. 27-30).

[29] Isaías, P., Miranda, P., & Pífano, S. (2009). Critical Success Factors for Web 2.0 – A Reference Framework. Heidelberg: Springer-Verlag Berlin. Kidd, T., & Chen, I. L. (2009), Wired for Learning: An Educator's Guide to Web 2.0. Information Age Publishing; NC.

[30] Kompen, R. T., Edirisingha, P., & Monguet, J. M. (2009). Using Web 2.0 Applications as Supporting Tools for Personal Learning Environments. Heidelberg: Springer-Verlag Berlin.

[31] Kristaly, D. M., Sisak, F., Truican, I., Moraru, S. A., & Sandu, F. (2008). Web 2.0 technologies in web application development. Athens: PETRA.

[32] Lassila, O., & Hendler, J. (2007). Embracing "Web 3.0". IEEE Internet Computing, 90-92.

[33] Lederer, A. L., Maupin, D. J., Sena, M. P., & Zhuang, Y. (2000). The Technology Acceptance Model and the World Wide Web. Decision Support Systems , 29, 269–282.

[34] Linh, N. C. (2008). A survey of the application of Web 2.0 in Australasian university libraries. Library Hi Tech , 26 (4), 630-653.

[35] Mahmood, O., & Selvadurai, S. (2006). Modeling "Web of Trust" with Web 2.0. Proceedings of World Academy of Science, Engineering and Technlogy; Volunme 18.

[36] Morato, J., Fraga, A., Andreadakis, Y., & Cuadrado, S. S. (2008). Semantic Web or Web 2.0? Socialization of the Semantic Web. Springer-Verlag Berlin Heidelberg.

[37] Motta, E., & Sabou, M. (2006). Next Generation Semantic Web Applications. 24-29, Heidelberg: Springer-Verlag Berlin.

[38] Myhill, M., Shoebridge, M., & Snook, L. (2009). Virtual research environments – A Web 2.0 cookbook? Library Hi Tech , 27 (2), 228-238.

[39] O'Reilly, T. (2005), What Is Web 2.0. Design Patterns and Business Models for the Next Generation of software (pp. 1-16); O‟Reilly Media, Inc.,

[40] Preciado, J. C., Linaje, M., & Figueroa, F. S. (2008). Adapting Web 1.0 User Interfaces to Web 2.0

[41] Multidevice User Interfaces using RUX-Method. Journal of Universal Computer Science , 14 (13), 2239-2254.

[42] Ramdani, B., & Rajwani, T. (2010). „Enterprise 2.0 : The case of British Telecom‟. Journal of Strategic Management Education, 6(2), 1-12.