

Virtual Reality and Its Implications on Digital Content Management

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Abstract

Virtual reality (VR) transcends the boundaries of the disciplines and lifestyles of different generations. The entanglement of digital content with the capabilities of artificial intelligence, graphic simulation, cultural coordinates, and economics has given rise to an amalgam of methods. The reality that is virtual, the virtual that is real. This multiplicity has caused content management to face unprecedented challenges and new avenues. New developments have been presented as an exceptional opportunity for specialists in various fields, especially information science. Interacting with VR requires accurate knowledge and sufficient competencies. Academic alumni, professionals, and leading researchers all think about how to interact effectively with VR and the resulting world. The emergence of metaphors such as Metaverse and serious public participation in cyberspace has necessitated the wise management of digital content following new developments and disciplines. In this paper, the characteristics of VR, including features, applications, and content management requirements for this new approach are explained.

Keywords: Digital Content Management, Virtual reality, Interoperability, Value Creation.

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Introduction

VR is no longer a metaphor but has become an important part of life. Most citizens spend a significant portion of their time in virtual spaces. The normal day of life for many citizens begins and ends with social media and checking messages and updates. This means that most people experience kind of a virtual life. As we all have a house to live in and an office to work in, we all have different profiles on different networks through which we engage our virtual life and work experience.

Writing e-mails, publishing articles in e-journals, shopping in e-shops, studying and teaching at virtual universities, and communicating through virtual carriers comprise an outstanding part of our daily activities. The important notion about *electronic* (e) as a suffix for modern entities is that an “E” version of everything is emerging and the digitization is not a choice but a necessity, and VR is the ultimate instrument of digital transformation. In other words, VR is a combination of digital content, spaces, and behaviors that assists in creating realities with a focus on simulation and graphics in a multidimensional perspective.

Accordingly, VR is considered a collection of digital objects and their relationships. With the tremendous rate of VR development and its influence on various disciplines, it is expected that a significant part of business and social communication will be represented in the form of this new reality, and this requires the digitization of as many objects as possible. This means that digital content management would be one of the main pillars of VR by which this new reality will be realized. Different terms have been used to conceptualize VR that among them *augmented reality*, *added reality* and *mixed reality* are popular and refer to the ongoing procedures of digital content management and its functionality as a whole process. This short paper explains the relationship between digital content management and VR and emphasizes the common areas and competencies required to enhance VR through optimized digital content management.

Virtual Reality

The concept of VR found its way into the realm of thought and creativity long before being popular as a term. Since the early 1930s, different spaces other than physical space have been mythologically spoken of. But there was a mostly fictitious perception from these kinds of new spaces. In the late 1960s, using a combination of instruments such as glasses, chairs, and sights, a simulated space was presented to the public, which could be used to simulate an

inaccessible space, such as conducting an airplane. Aviation position simulation may have been one of the first applications of VR.

Finally, in 1987, the term VR was first used. Since then, VR-based games, multi-dimensional geographical representations, and multi-layered images have introduced people to new realities that had not been seen before. Collective images along with audio and video and planned movements along with multi-dimensional cinemas have introduced the new reality to citizens.

The most important advances in VR belong to the development of multimedia content and significant advances through graphical simulation. At this point, with the help of smart computers, images were transformed from static entities into programmable entities. The addition of various compositional dimensions to graphs and deep planning created revolutionary decomposition capabilities in the field of combining motion with planned landscapes..

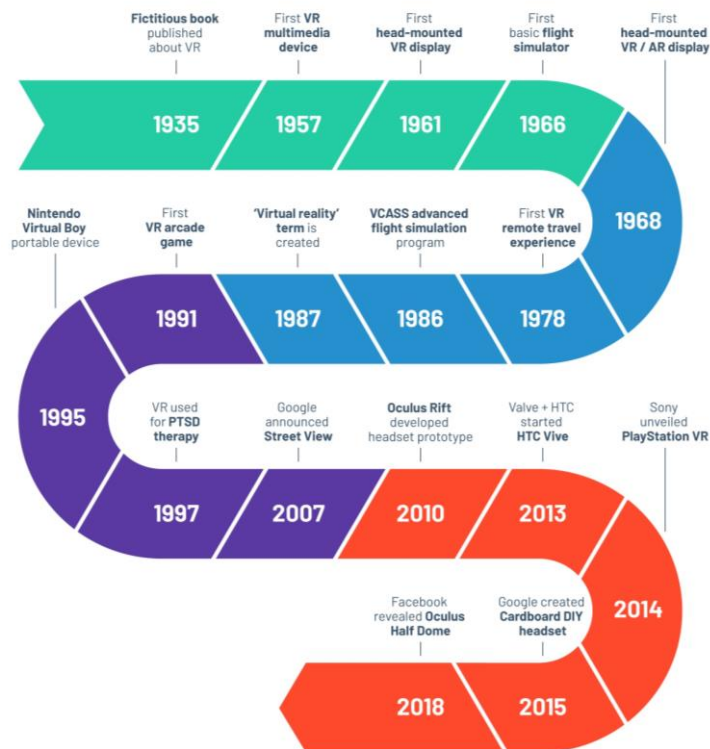


Figure 1. VR timeline (Poetker, 2019)

Together with the entering to the third millennium, the growth rate of VR-related technologies also has been accelerated. The process that began with the emergence of the Internet is now advancing with the development of social networks with greater breadth and depth.

The virtual world along with avatars and surrogate agents and learning simulators has made the image of VR clearer than ever. The use of VR in various fields such as tourism, cosmology, flight, medical surgery, representation of the subcellular space, and simulation of everyday life has become popular. The education process is among the demanding entities of VR applications. Learning the most complex abstract concepts is made possible by VR. For this reason, the construction of educational tools based on VR is progressing day by day. Concepts such as virtual laboratories have accelerated and facilitated the process of carrying scientific experiments.

Features of VR

The symmetry of VR with the entities of the physical world has led to the increasing convergence of innovation with everyday applications. The most important benefit of combining the real entities with the virtual features and the emergence of VR is the development of human beings' ability to realize their long-held dreams and imaginations. VR has also affected the information retrieval procedures and the way entities are represented. The combination of several realities to create a new reality has enhanced the capability and capacity of humans to build new worlds based on their imaginations.

In the age of VR, the boundaries have been blurred, the connections of concepts are intertwined, and metaphors become reality. The increasing conceptualization of entities (previously only physically identifiable) has brought them closer together. Multidimensional and dynamic communication between concepts has developed the ontological network of objects.

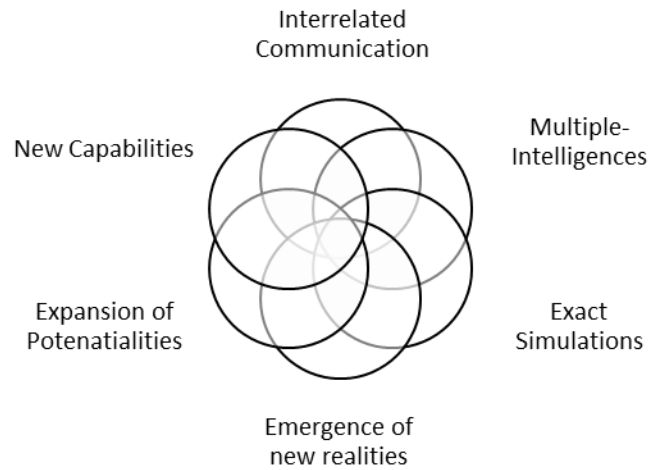


Figure 2. Main features of VR

Interrelated communication is the most important feature of VR. In a virtual object sound, image, motion, behavior, prediction, interaction, transformation, evolution, and multiple communications are easily embedded.

Being interrelated and having new capabilities the VR has enhanced the interchangeability of objects and as a result, the concept of time and place was changed so that the convergence of the future with the present and past can be done much faster. Virtual avatars and their vertical and horizontal movement beyond time and space have led to the emergence of new capabilities for simulating and representing facts. The understanding of extraordinary objects has become very believable. This has contributed to the endless innovation of human beings. In virtual environments, people are not bound by the image and coordinates of known entities. For example, different forms of objects, or places can be designed and represented. A VR designer gains a lot more freedom of action than a traditional designer. Of course, this freedom is not limited to designers only. Audiences and users also have less difficulty accessing, understanding, and interacting with unprecedented entities.

The development of new potentials and the emergence of new realities require the production of diverse, dynamic, multidimensional,

and programmable content. Content used in VR is defined by its interoperability with other content and materials. For example, the components used to represent the anatomy of an object must be able to represent the behavior of the physical object in addition to its shape and image.

The combination of light, image, and various multimedia effects makes the new realities more believable and attractive. For example, to simulate the exact function of the heart, in addition to putting together multiple images of different positions of muscles, arteries, and bones, their precise behavior is also being simulated and implemented.

The world of VR-enabled bodies is a world of multiple capabilities and intelligence. The single-dimensional perspective in the process of emergence and evolution of VR has given way to a multidimensional and evolutionary approach. For this reason, fundamental and revolutionary change is possible at any moment. These possibilities have led to the production and management of digital content moving more rapidly and rapidly. Such convergence has emerged the requirement for interdisciplinary and multidisciplinary collaboration of different specialties inevitable.

Applications of VR

VR is increasingly being adopted in various fields and domains such as education, management, innovation. For many years, human beings' perception of their surroundings was limited to their experience and observation. The invention of imaging tools and the development of multimedia content and carriers increased their understanding of reality. But VR has paved the way for human ideals and the path to his/her perfectionist ambitions.

VR-enabled education has experienced a new revolution. The application of intelligent factors in the training process has greatly improved argumentation capabilities. The capabilities of intelligent tools in carefully examining and analyzing questions, answers, making connections between learning processes and intellectual outputs have provided teachers with enormous possibilities to focus on constructive teaching practice.

Analyzing education and relating findings to objective realities has deepened the perceptions of educational administrators, planners, and educational designers about learning bottlenecks.

The use of virtual agents and the multidimensional representation of phenomena has made education a pleasant and relevant experience. Many of the accessories and instruments available to learners and teachers today through virtual and integrated classrooms are unmatched by any other eras.

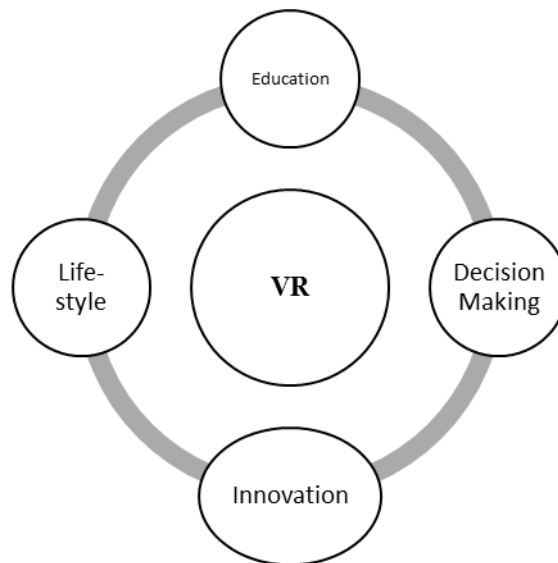


Figure 3. Key functionalities of VR

Decisions are made by simulating different scenarios much more accurately and with comprehensive awareness. Along with having VR capabilities, a manager can access customized comprehensive information of scenarios and their consequences. For example, the decision to implement a project is not made in a dark room, but its various aspects and the success rate are estimated and provided to the manager. Technologies such as gamification have allowed managers to take advantage of the capabilities of all actors, and this contributes to more innovation.

Perhaps the most important dimension of VR space is the enrichment of concepts and inferential networks that result in creating a connection between entities and their behaviors with the desires and imaginations of actors. Infinite innovation and awareness of

immediate achievements and their application, in reality, have given people more motivation to be creative. The contribution of content attractiveness and their leadership in creating a connection between the ingenuity of the audience and the creative context is very high. Content determines the level of motivation of VR structures.

In general, the whole lifestyle is influenced by VR. The role of multidimensional models, extensive communication, the possibility of manipulating the construction of facts and creating desirable entities have affected the way people look, behave and think. For this reason, Generation Z is fundamentally different from previous generations in terms of the way it deals with phenomena. Acquiring extensive knowledge of phenomena, international interactions and technological life has influenced the formation of their lifestyles.

Determinants of content management for VR

Identifying and strengthening the determinants of content management in the VR system, requires full consideration of the role of content management in the emergence, development, and effectiveness of VR. Almost all VR functions depend on the richness of the digital content embedded in the explanatory and analytical procedures and relationships of entities. The success rate of VR-related applications mainly depends on the quality of digital content management which must include at least three key elements: organization, analytics, and learning.

Digital content is a set of individual but interconnected components. Each component of digital content is an important part of a whole. For content behavior to be predictable and to be interchangeable with other systems and content, accepted rules and frameworks must be established and promoted. Lack of organizing and unifying rules will challenge the exchange of content through networks with diverse actors.

The coefficient of internal and external integration of VR content can make their behavior more believable and effective. Content integration acts as a factor of coherence and validation.

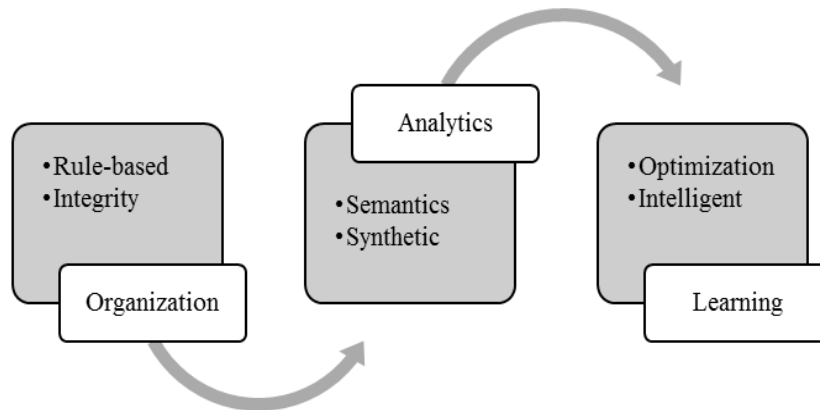


Figure 4. Determinants of digital content management

Analytics is the dominant trend in various sectors from economic, social to political, and technological. Acquiring data, refining and preparing them in the form of specific frameworks, and extracting knowledge from bulk data are among the main features and capabilities of the analytical approach. The transfer of analytical capacity from humans to intelligent machines has increased their potential even more.

Digital content management in the form of VR-based mechanisms on the one hand looks at analytics as a tool for continuous improvement of content structures, procedures, and mechanisms. On the other hand, knowledge extraction from VR processes is considered as an added value for future exploits. Therefore, both the semantic and synthetic dimensions of content are valuable to content management structures.

Knowledge extraction using VR analysis has redefined some concepts. For example, today digital currency as a means of exchange has provided different ways of exchanging value. Most of these currencies are not based on physical and nationally accepted currencies, but cryptocurrencies based on complex network acceptance. Meanwhile, from the content management perspective, semantic and synthetic approaches have changed the role of intellectual properties and their relationship to ubiquitous economic and social activities.

The latest set of determinants of digital content management emphasizes learning. The transfer of the task of learning from humans to machines has created new capacities. Human learning was through experience, observation, and interaction. Machine learning is done through derivative algorithms and continuous self-reconstruction. The ability to rebuild capabilities has given machines the ability for scheduled interaction.

From a content management perspective, optimization is considered a tool for learning. In the future, machines or systems that can optimize learning will survive. For example, machines that can continuously improve and correct their errors will be more successful in exploring distant planets. Continuous optimization enables adaptation and effective learning.

As a result, in the future, we will see the emergence of machine intelligence that will complete human intelligence. The tremendous growth of machines and their usage in planned learning and enhanced analytical capabilities will provide them with a level of self-made intelligence. And that will give another milestone to smart processing, and that will be the pinnacle of digital content management.

Key competencies for the VR era

Playing a decisive and effective role in creating and creating digital content in the age of VR requires achieving multiple and leading competencies. As the pace of change in the development and growth of digital content accelerates, so does the need for change by professionals and experts.

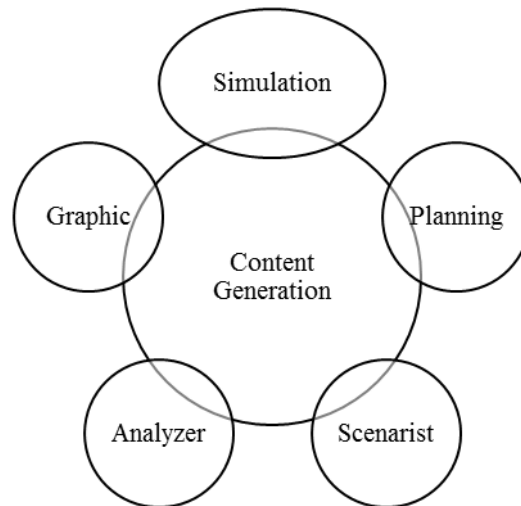


Figure 5. Key competencies of digital content management

If a traditional animation designer or producer needs to be familiar with the techniques of making hand-drawn images and mastering them, mastering the relevant digital tools is essential today. An extensive network and valuable tanks of ready-to-use raw materials have helped speed up the work. At least five core competencies are required to qualify for digital content management:

- simulation
- planning
- Scenario planning
- Analytics
- Graphics

Simulation is no longer a choice but a necessity in the processes and procedures of digital content production, especially in a VR environment. In the first generation of simulations, the greatest focus was on shape simulation, but today, in addition to form and behavioral simulation, simulation is the prediction and emergence of innovative behaviors and interactions that new generations of robots have. They

exhibit behaviors that have not been previously trained in algorithms. They show innovation.

Competency planning is based on accurate knowledge of the needs, utilization of facilities, and their calculated strategy to achieve predetermined goals. The ability to plan and target accurately helps to create mechanisms commensurate with unforeseen changes in complex operational environments.

Scenario planning and predicting their probabilities and desirability is one of the most important competencies needed for digital content management in the new age. The complex world is the world of uncertainties. Our ability to identify complex and ambiguous situations and achieve a more accurate picture can affect our mastery of equations and the accurate interpretation of their unknown dimensions.

Analytics is concerned with the ability to extract knowledge from data stored and generated by intelligent digital agents. Today, there are a variety of tools for in-depth analysis, such as big data. The ability to use these tools increases the management skills and capabilities of agents.

Concluding remarks

Everyone who has migrated to a new era as an immigrant from the pre-digital age understands the difference between pre-digital and post-digital space. Substantial differences are derived from different perspectives such as communication, interactions, analysis, behaviors, and even the way of thinking. Today, a more accurate and in-depth understanding of many phenomena has been achieved, and the level of knowledge of individuals about phenomena and their relationships is changing rapidly.

Digital content has played an important role as a facilitator and carrier in the transfer of knowledge and change of outlook and lifestyle. The advent of VR, on the one hand, has created a serious

situation and, on the other hand, has necessitated the need for more complex, intelligent, and interactive content.

As changes in the industry have accelerated the Industrial Revolution 4.0 and accelerated the trend toward the Fifth Revolution, and just as transformational knowledge management as the new generation of knowledge management (Hassanzadeh, 2021) has become inevitable, so does the need to change the way we look at management. Digital content is also obvious. In the age of digital transformation, we feel the need to manage digital content 2.0 well. Digital Content Management 2.0 is widely associated with intelligent agents, knowledge-based systems, and interdisciplinary collaboration. In this generation of digital content management, content is not just a tool, but a defining part of VR and an identity-building agent.

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