DIGITAL CREATIVITY: ADVANTAGES, PROBLEMS, RESPONSIBILITIES

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Abstract: The paper focuses on the rapid development of the digital culture and the challenges it imposes to human creativity. It analyses e-learning, digital entertainment, digital art and the issues of creativity and improvisation. It also presents a classification of the levels in the creative structure including hardware and software tools; product developers; creators and end users. Special attention is paid to the advantages of the new digital culture and the responsibilities of all people who create it or use it. We conclude that more attention should be paid to the threats and to ways of boosting positive creativity in the various fields of application of information and communication technologies.

Keywords: digital art, creativity, improvisation

Introduction

The rapid development of information and communication technologies (ICT) implied important changes in the human lives. The earliest uses of computers were very narrow-profiled and applied in specific sectors and professions. Nowadays, ICT accompany people from early childhood in the educational system, at work, in the societal organisation, in everyday life activities, and at leisure. This trend seems so natural that one important shift was left somewhat behind the focus: the function of computers changed. Starting with support for humans in routine tasks, nowadays computers became in the centre of wide range of tasks, which involve human creativity. This is obvious in areas related to computer art, but is equally important in entertainment and educational applications, which form the fabrics of the human personality, including the creativity.

The basic aim of this paper is to increase the awareness of creativity related issues in the modern computer world and its influence on the human personality.

We provide an analysis of the typical areas influenced by the new digital culture: e-learning, digital entertainment, digital art and discuss the issues of creativity and improvisation in the digital environment.

We continue with a presentation of our view on the digital culture ingredients and their inner dependencies. The basic ingredients of the digital culture include hardware and software tools, developers and users. The users basically form two groups – consumers and creators. One would expect that one consequence from the use of the ICT would be increased creativity and improvisation. This matter is not studied yet and we hope that this paper will raise the interest to it.

Finally, we present a SWOT (Strengths-Weaknesses Opportunities-Threats) analysis of the digital culture. Our basic conclusion is that more attention should be paid to raise the awareness in the threats and to boost positive creativity in order to support the development of the unique distinctive creative nature and potential of the human personality and to save the human values in the society as a whole through the various fields of application of ICT.

Forms of Life of Digital Culture

Nicholas Negroponte, the founder and the director of the Media Laboratory at the Massachusetts Institute of Technology, wrote in the introduction to his book *Being Digital*: "Computing is not about computers anymore. It is about living" (p. 6, [Negroponte 1996]).

The digital technologies led to the creation of a new world, a 'different reality' that we often call 'virtual space' or 'virtual environment' (VE) The technological developments, which make possible human beings to immerse into it, are becoming more and more mature. Almost everything which one could ever imagine could be modelled inside of the virtual environment: one can 'live' and 'do' there, i.e. one can simulate all types of human activity.

There are several application fields, which are particularly strongly influenced by the idea of virtual environment and human immersion:

- o E-learning
- o Digital entertainment
- o Digital art and its genres

E-learning

E-learning is defined as "The use of new multimedia technologies and the Internet to improve the quality of learning by facilitating access to resources and services as well as remote exchanges and collaboration."[1]This definition puts the emphasis on two basic issues: specific technologies (multimedia, Internet) and on the process of learning. In this field, there is enormous space for creativity. We are moving to the development of a virtual community, which shares a common educational content.

However, the e-learning should not be overestimated. Even if fields like linguistics or pure information, there is a small share, which can be filled in only by the real practice. Without it nowadays and in the future the process of learning could not be completed adequately. This is not only due to the fact that devices simulating physical sensation (haptic devices, olfactory interfaces, immersive visual interfaces) are still not perfect, but because of the impossibility to simulate and substitute the human presence. The contact with the other person, no matter whether he is a supervisor, partner or patient, and most over the vivid human feedback could not be replaced even in the most advanced digital technologies. To many people this statement could seem old-fashioned, but we should not neglect that in each human sphere there is a certain amount of knowledge, which can be transmitted only via personal contact.

Michael Polanyi, the creator of the theory of the personal knowledge, concludes that there are two types of human knowledge – the first one is obvious and logical, and the other one is hidden, peripheral [Polanyi 1962]. The second one is acquired through studying of the internal structure of the object of study and this type of knowledge can be transmitted only through personal contact between the teacher and student. The obvious knowledge is transferred logically and verbally. The hidden knowledge is transmitted only directly in the contact of teacher and student.

The informal personal knowledge could be transmitted only within the process of personal contact. Thomas Kuhn investigates the phenomenon why good students most usually are not becoming successful researchers [Kuhn 1962]. He suggested that this is due to their maturing basically through reading textbooks and the lack of personal contact and real practice.

Of course, we are not denying the role, place and the meaning of the e-learning. It is a new kind of enriching the forms of education nowadays. Being accessible, financially profitable and safe in the cases of simulating of critical situations, it is unique and can give us a lot, and shorten the periods of training. In the future, it could become obligatory way of knowledge acquisition. But we should understand that it could be necessary, but not sufficient form of training and it is better to use it as a step to the last phase of training: the real practice in our "material" world.

Digital Entertainment

In the USA the number of sales of games already overcomes book sales. In the UK the games are exceeding by 80% video rentals [Ross et al, 2003]. This illustrates the great power of games industry and opens the question how it is actually utilised by the society.

The possibilities for building edutainment (educational entertainment) products involving computer games in the field of cultural heritage are studied in [Sotirova, 2004]. This paper shows clearly that developing games with cultural and historical content is a difficult process and needs special measures from governments or other organizations which would support it – otherwise the companies would normally go for the development of more cost-effective products, which on the long-run do not contribute to the balanced development of the young generation.

In the digital entertainment we find the combination of spectacular scenery and personal involvement, 'real' participation in the virtual life. The attractive power of games is in immersing in worlds, which exist only in the imagination. While in the daydreams one can model the reaction of the opposite side and the outcome of the

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[1] http://www.elearningeuropa.info, last visited on 22 April 2004.

events, here one meets other people or artificial intelligence, which are beyond his power. Here the opposite side is independent, acts on its own will, has its own logic and the outcome is not predictable. This builds the adventure spirit and makes the emotional experience especially strong.

Digital art and its genres

The search for the term "Digital art" returned 1,580,000 results on 22 April 2004. There are websites, which provides tens of thousands of pages of galleries and advice for the digital artist. A typical one is 'The Digital Art Community"[1] which offers tutorials for the people willing to become digital artists, e.g. 3D modelling/Animation, anatomy and Figure Drawing, Concept and Design, Digital Illustration and Painting, Photoshop Effects and Tips. On the one hand, we witness enormous amount of resources on this topics and of works called by their authors 'digital art'. On the other hand, the advice, which is given, most often is targeted to acquiring technical skills. Is this what makes the artist? Where one could learn creativity or improvisation?

Now in the digital environment we have plethora of new art directors, new scriptwriters, new artists – this is the new art. However, the aesthetic, moral and spiritual laws which are valid for the traditional art are valid here too; the same codex and the same principles because the essence of the art is the same, only the tools are different. But we should take into account that the new art compared to the traditional one is different in the sense of power of effect on the human consciousness. The power of art, the large media scale, the magic of the drugs, all of these are collected here, but strengthened several times. Its power of effect is tenfold bigger than that of the cinema and visual arts; hundredfold than that of the theater and thousandfold more than that of the literature, because it collects all of them together.

Digital creativity and improvisation

A substantial part of the software tools – these for graphical design, manipulation of 3D objects, space and animation, as well as the specialised applications for creative modelling, e.g. in fashion, agent and avatar technologies, stimulate the development of the creative nature of a growing number of people. Everyone could find something, which suits his personal taste; his individuality and interests.

For example, People Putty is a program from Haptek[2] that allows one to make his own interactive 3D characters changing skins, shapes, emotions and accessories. The game developers are also creators. Every digital maniac could create a game and settle it with creatures without being trained to draw, to write or to compose music. People can make different things: their own greeting cards, electronic journals, web pages and thus have numerous opportunities to create.

The most incredible is that everyone can try whatever he likes – to draw, to design, to fight, to test crazy ideas, to make impossible dreams become true. The most substantial advantage is that everyone can **improvise**, i.e. to entertain himself, to reveal **creativity**. Everyone could be an artist, architect, musician, designer, builder, warrior, politician, king, and even God! This is so easy, safe and without any responsibility! And that is the most dangerous side of it. False creative self-confidence is being formed and the need for preceding professional training disappears. This leads to invasion of unprofessionalism in the art. Creation of clichés suffocates originality and creative thinking. Every work despite its artistic value becomes public and natural censorship regarding artwork and artists is lacking. All this leads to decay of the esthetical criteria and expectations of the user.

The improvisation in the digital environment is basically taking the form of a game and creative entertainment, while the professional creative improvisation has a preliminary defined topic, clear idea and a structural skeleton around which the improvisation is built. The topic and the idea are leading in the choice of means of expression and the connections within the skeleton. The creative improvisation follows one general idea and a message. The difference in the digital improvisation is in the level of consciousness and preliminary planning. Digital improvisation can cover the range of irresponsible entertainment to the conscious creative act, but this depends on the user. Thus, the users can range from users consumers to users creators.

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[1] http://www.gfxartist.com, last visited on 22 April 2004.

[2] http://www.haptek.com/, last visited on 16 May 2004.

The Digital Culture Ingredients

After presenting the fields, which are most strongly influenced by the modern digital culture, we would like to discuss what are its current ingredients and bearers. We start with the traditional grouping to *hardware* and *software* and add two core groups of people connected with the digital culture: *developers* and *users.*

Hardware

The computer hardware is the presupposition for the functioning of a specific application. It could facilitate or make more difficult the execution of a specific task. The current struggle of companies in this field is for building devices, which are *easy to use, do not require special education and effort*, and are *portable* (see the section on Human-computer Interaction in [Ross et al., 2003]). Additional trend in the recent years is that the specialisation of devices blurs and we use more and more *multifunctional devices*, e.g. mobile phones, which include game stations, digital cameras, audio recorders and players.

One trend of special importance in the current hardware developments is the increased role of *virtual environments (VE)* opposed to *augmented reality.* One important concept related to VEs is the human *immersion* (see, e.g., the section on Virtual reality in [Ross et al., 2003])

Virtual Environments

The basic role of VE technology is to provide tools for the development and use of computer-generated artificial environments. It is believed that thus users will interact with the environment in natural and easy ways. In this respect the interface issues play crucial role. Probably the basic reason for interest of professionals in VE systems is that they contribute to work on new application areas, which were too expensive or dangerous before (like underwater and space work, hazardous environments, simulation of natural calamities). In addition it is considered that well-designed VEs would provide more intuitive metaphors for human-computer interaction. VEs quickly become one of the basic ingredients of computer games.

VEs can be divided into three groups differing on the sense of immersion they provide: *non-immersive, semi immersive* and *fully immersive* [Ross et al, 2004]. Immersion is measured by the power of attention, which the user focuses on the activity and his/her sense of presence in the environment. The sense of immersion is directly connected with the number of senses involved in the user work. This goes beyond the visual and audio communication channels, which is traditionally used in human-computer interaction and involves devices, which use the sense of touch, sense of smell and movement.

For the visual channel, despite the display characteristics, other factors contributing to the sense of immersion include image quality (including number of dimensions) and the speed and level of interactivity of the system.

Non-immersive systems are the weakest ones. The VEs are simulated on a desktop computer with a standard high-resolution display. Keyboard, mouse, joysticks are employed for interaction with the system. Data gloves often are used in such systems to involve the sense of touch in the user work.

Semi-immersive systems provide better sense of immersion. This is achieved through the use of large screens of multiple projection systems such as CAVEs (Cave Automatic Virtual Environment), and shutter glasses.

Fully immersive systems currently are based on the use of head-mounted display (HMD) technology. They give highest sense of immersion, although the image quality compared to previous technologies is worse.

Health issues are often raised in connection with immersive systems. Dizziness and lost of sense of orientation can be caused by the use of VE devices. Most commonly these problems are connected with the use of HMDs which are reported to physical, physiological and psychological problems. HMDs may also lead to posture problems because of the additional load on the body.

Augmented reality is a concept taken in contrast to virtual reality. Unlike virtual environments and their imaginary experiences, augmented reality uses the modern computer technologies to supplement the perceptions of the user of his actual surrounding. The basic factor for building augmented reality is not in different devices, but in the content of information provided to the user and its relation to the real world surroundings.

Care for Impaired Users

Another important trend in current technological developments is the greatest care for users with visual and other impairments. Thus people who were not able to use computers before join the computer society.

In the last years, we witness technological changes in the hardware every six months, and the appearance of novel devices. The history of computing never witnessed such plethora of devices with different technical capabilities and underlying concepts. The challenge to the users in this respect is to be open to new developments; form clear views on the necessity to master a new device and quickly learn to use it.

Software

The next level of interest in the computer culture is related to the employment of new hardware possibilities in the development of software.

In software development nowadays, several trends are influencing the development of systems, which are more attractive to the users:

- o Personalisation of users in the virtual environments through use of avatars.
- o Tele-presence applications, which contribute to form the sense of presence at another location.
- o Building virtual communities.

Personalisation of Users

The virtual presentations of human users in the computer environment are called avatars. Human presentations of computer processes or programs are called agents. Both avatars and agents assist in forming the sense of social dimension in the human-computer interaction. Their use does not involve heavy bandwidth necessary for use of other technologies presenting the real user in the virtual environment, such as video conferencing and this explains their growing popularity.

Telepresence

Telepresence is defined as "the use of technology to establish a sense of shared *presence* or shared *space* among separated members of a group" [Buxton 1992]. Telepresence is a step ahead of video conferencing. It is of special importance due to the fact that it enriches communication with non-verbal aspects: gestures, eye contact, and spatial perception. Telepresence blurs the sense of reality of the user and moves him/her to another place.

Virtual Communities

Modern ICT offer a broad range of tools supporting communication and help people to be in contact with other people from all over the world. In the beginning, the communication tools were text-based and asynchronous, such as the e-mail and mailing lists. Later, instant messaging, multi user dungeons and video conferencing added other means and synchronised the communication. Peer-to-peer technology allows people in a community to exchange resources [Ross et al., 2004]. Virtual community is defined as a network of individuals/organisations using digital technology to create and use shared experience and knowledge.

Knowledge and *emotions* are the two typical centres around which communities are being built. In the first case, people collect and exchange opinions, learning materials, information how to do something or where to find particular content, etc. In the second case, communities gather to fulfil emotional or communication needs.

The Humans' Basic Roles: Developers and Users

People immerse in the digital environment in two basic roles: developers and users. The users can be themselves creators, or passive consumers.

Fig. 1 presents the relationships between the different components of the digital culture.

In the digital eye centre (see 1) is the field of new digital technologies (**I**). Around it, from the centre towards the periphery, are differentiated its adjacent inheriting areas (**II, III, IV**). However, the links between them are neither linear nor hierarchical and these areas are overlapping and intersecting each other (see 2). Thus the image of the Digital Shell (see 3) is being formed. Surrounded by the amorphous area of the consumers (**V**), this metaphor gives an idea about the digital culture which conquers our society slowly, gradually, but undoubtedly.

The process is bi-directional (see (4)). The digital shell (A) develops and perfects its products around the needs, interests and expectations of its users (B). They play the role of the small grits which boost the development of mother-of-pearl – in this case of the research quests and the development of innovative technologies, while finally

the pearl itself – i.e. the specific product, appears (see C). On this stage the new product has been delivered back to the user and influences his future interests. Thus, the developers of the digital products represented by the digital shell strongly influence the interests of the mass user. This two-fold process enhances the development of each tendency and also of the mistakes, if they had been done.
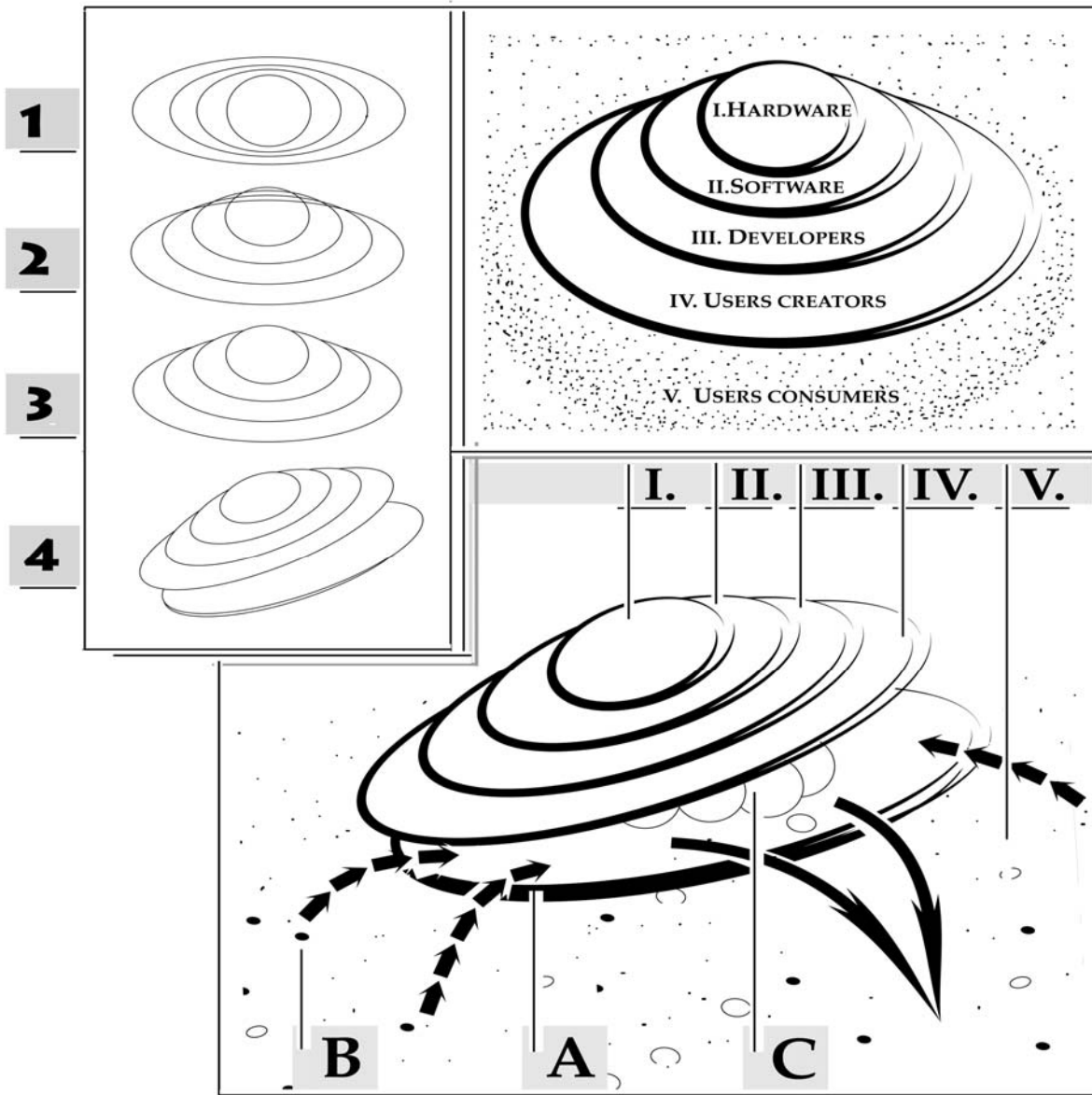

Fig. 1. The Digital Culture Ingredients

The digital shell should educate the users taking into account their interests, without allowing they to become leading ones. However, this is not easy to achieve in the market economy where the basic concern is the profit, which could lead to domination of the bad taste and low criteria due to the sporadic nature of the mass consumer.

Conclusion

Finally, we would like to summarise (see Table 1) the strengths-weaknesses opportunities and threats of the current virtual environments.

STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
Globality and dimension of the net: the new technologies can unify the world not only in the sense of information, but also in the sense of social issues. The problems being regional or private become global and shared.	The lack of order leads to chaos; many issues are not noticed which causes the 'voice in a desert' effect.	Dissemination of knowledge. Faster problem solving. Unifying the efforts of people from all over the world in problem solving. Building synergies in decisions making.	The effect of negative messages is multiplied.
Immense power of effect of the digital culture on the human consciousness.	Lack of order and control. Anonymity and lack of responsibility in the cases of misuse.	These technologies could contribute in the cases of global problems (ecological, terrorism, etc.) which solution requires behavioral change in humans. Raising of moral and ethical norms common to the mankind.	Manipulation of the consciousness, malicious use and propagation of false moral values. Deliberate or sporadic destroying of the moral ideals.
VE can be used to model and simulate almost everything one could imagine.	Immersion is still not 100% possible.	New possibilities are opened for training, education and entertainment.	The real life is shifted; asocial behavior can grow.
New educational opportunities: low price, mass coverage.	Knowledge obtained is incomplete (the practical experience and 'hidden' knowledge can be achieved only through personal face-to-face contact).	One can gain precious experience for situation, which are too dangerous to be learned in the real world (e.g., modelling of hazardous environments, calamities, space etc). Involvement of outstanding personalities in the learning process is easier in the VE than in the real world.	There is a danger to overestimate this type of education and to throw off the real practice, which could lead to abundance of low-level graduates.
Considerably greater possibilities for creative activities (professional, hobbies, and entertainment). Everyone could try himself and act as an artist, architect, musician, designer, animator, director, etc. without being formally trained to do this.	Diminishes the formal need for preceding professional training. Lack of natural censorship regarding works of art and artists, compared to classical arts. Every work despite its artistic value is made public.	Stimulation and development of the creative nature with appropriate creative games.	Invasion of unprofessionalism in the art. Building false creative self-confidence. Decay of the esthetical criteria and expectation of the user. Creation of clichés suffocates originality and creative thinking.

New possibilities for entertainment. Things impossible before become possible: immersion in activities and situations, wars, research missions, magic worlds, entry into impossible roles (warriors, magicians, emperors, Gods). Safety. Lack of fear of the consequences. Freedom and completeness of the experience.	Lack of connection between action and consequence in all personality aspects: physical, physiological, moral, social. Lack of risk, lack of fear of fatal errors.	The hypnotic power of the digital entertainment could be connected to the education in a way, which leads to improving its outcomes.	Weakening of the sensitivity and the instinct of self-preservation (making harm to self and others). Feeding the low human passions: aggression, power-loving, and cupidity. Lack of responsibility for one's actions in life. Lack of understanding of the importance and irreversibility of life events and developing of 'undo' behaviour.

Table 1. SWOT analysis: Digital Culture

This paper was written with the idea to attract the attention of IT professionals on the deep meaning of their work on the personal development and, respectively, on the society as a whole.

If we take as a starting point Nietzsche's thought "A person's maturity consists in having found again the seriousness one had as a child, at play."[1], we can say that current technologies are on the way to assist one to find the way back to his childhood by a number of external factors, such as hardware devices and interfaces. This cannot be claimed for seriousness, feeling, passion – and how often the developers or users themselves realise this?

It is unlikely that the ideological predecessors of the World Wide Web imagined what changes in human lives its appearance would actually cause. We should realize the responsibility. The mankind knows cases when its own creations turn against it.

We should not forget that digital technologies are not an end in themselves, but a tool for support and development in our lives. But they are also an element with an immense power, like the fire and nuclear energy. It depends only on us whether this element would serve us or will come out of control and how we will use it – for creation or for destruction.

Let we will be led in our digital creative acts by the humanity and the care for people; by the unique distinctive creative nature and potential of the human personality and the preservation of the human values in the society as a whole and not by the technology itself.

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[1] Friedrich Wilhelm Nietzsche, Beyond Good and Evil (1885-86)