VIRTUAL INTERFACE

CHANGES OF CONCEPTS AND TECHNOLOGY IN THE CONTEXT OF VIRTUALITY

Adam Gorczyca
Warsaw University of Technology

Abstract

The paper is a comparison of interface changes as a result of modern concepts and a new hardware development. It explains the notion 'virtual' and its application in a few generations of user interface.

Modern interfaces are chained with simulation technology. The meaning of simulation is strictly related to the notions: possible, actual, potential force. All of them are ingredients of 'virtual'. Finally interfaces bring to the point: what virtual is?

1. The meaning of virtual

Answer to that question is diverse and multiplanar. It conveys at least three meanings.
According to philosophy virtual is possible, but not now, potential but not actual, like the seed of the tree. This way of reasoning was presented by Paul Virilio, Gilles Deleuze and Peter Levy.
In common use people often misuse 'virtual'. It is associated with 'impossible, not existing', which is a great misunderstanding. Following this reasoning the term VR (Virtual Reality) should never exist and should become a pun, a funny oxymoron.
The third meaning, technological, says that 'virtual' is the way of perfect simulation, a sort of deception of mind. It should be referred to Sherman & Judkins, who invented the notion '5xI'-'intensive, interactive, immersive, illustrative and intuitive'. It might also be based on similar definitions by M. Heim or J. Holzer. They describe virtual reality as: 'simulation, interaction, artificiality, immersion, telepresence, full body immersion and networked communication'.[1]

2. How is 'virtual' present in the architecture?

According to many researchers and designers the notion 'virtual' in architecture may be interpreted in a few manners.

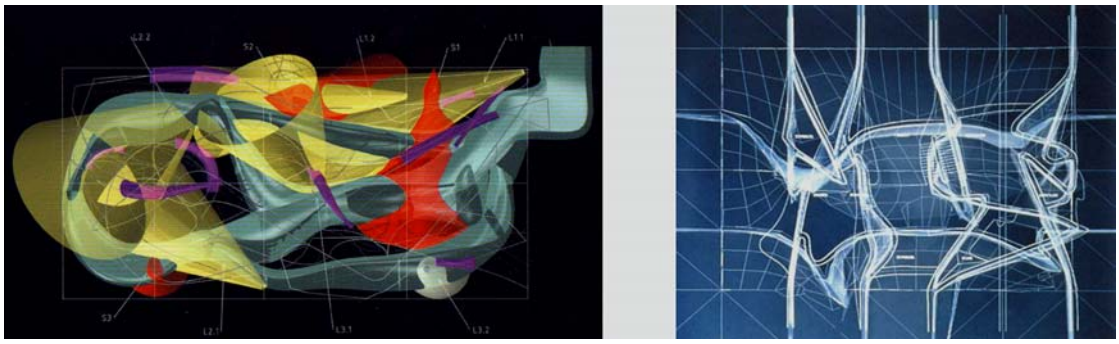

Figure 1: Virtual methods of design: (left) Chamberworks - 'soundscape' - diagram of interaction user/sound/video by OCEAN, (right) Virtual House by P. Eisenman - a 'gravity free architecture' derived from tracing and mapping (floor plan).

The easiest to perceive and understand is modern technology present in contemporary buildings. It makes them more and more flexible, mutable, 'liquid', therefore virtual. This technological development leads to the 'handicapped house'[2], which surrounds the user with intelligent lights, music, and air-condition, where no longer 'form follows function', but rather 'function follows user needs'. More virtual buildings, like an interface, response for human needs and reactions.
But 'virtual' in architecture means also the way of design, combining the real and potential[3]. As a result of their interplay architects were given a new spectrum of possibilities.[4] They differ from technological developments, can be described as 'design method' and are strongly computer aided.
The most important methods, which exploit virtuality are diagrams used differently by Peter Eisenman, Lars Spuybroek, OCEAN, or Kolatan MacDonald Studio. All of them actively use 'virtual' space.

The third context of virtuality in architecture is an idea of widening the real, or rather redoubling it by the virtual, which fructify as conventional space. This context has independently been developed by Derrick de Kerkhove[5] and Paul Virilio[6]. It leads straight to the notion 'virtual reality', because the real and the virtual world are inseparably connected. It is very close to philosophy, but thanks to the highest technology it is often possible to render.

3. How is 'virtual' present in the interface?

Interface is understood as the way of communication between the human and the machine. It can be very abstract – from punching holes, typing, mouse-clicking, talking, to motion-recognition and all kinds of simulation. Development of the interface can exploit anything to make it better, more efficient and intuitive. It involves both: technology and invention of new ideas.
Technology interface development is focused on (1) miniaturization, (2) multimodality, (3) simulation and (4) dispersion. It exploits powerful tools, which offer immense potential possibilities, therefore becomes more and more 'virtual'. Just like CAVE and VRD are more 'virtual' than keyboard and mouse. One may argue and say, that the latter leave more for the imagination. In this sense the book, typing or handwriting are the most 'virtual', as human creation-ability is much more perfect, than any simulation. In fact it is, but not in the human-machine communication.
People invented almost perfect interfaces, which use simulation and involve almost all human senses. They transferred their bodies to virtual worlds, forgetting about the human and concerning machines too much. Nowadays the ill-defined problem: 'HOW TO USE INTERFACE to have some work done?'

Figure 2: Disappearance – embodied ideas of P. Virilio and K. E. Drexler. (left +middle) ICL mainframe computer from 1960 and laptop Packard Bell PIII 1200, 2002. (right) IBM hard drive from 1984 (4MB) and from 1999 (6GB)

should be replaced with: 'HOW NOT TO USE INTERFACE AT ALL?'. Once they apparently disappear together with full functionality, then they will become really virtual.

4. Development of interface technology and concepts

Before computers

People used to communicate without additional assistance. They did not use any 'translator' - interface, as the machines were too primitive to do it. First they used their body language, then expression of verbal and written words. The natural interface consisted of mouth, ears, eyes, and other receptors. There were some 'virtual' interfaces, like text, paintings or music, but they were nor interactive, neither served for communication with machines.
The external interface tools, like pencil, violin or brush were simple, although the mental process, which took place in mind, was complex. The ability of creating virtual worlds in human mind was the first simulation, the first virtual reality. Philosophers, like Kant, tried to prove, that these 'virtual' states of mind are the part of reality.
So much confusion about virtuality was already present, before machines were able to communicate.

Text Interface

Computers were the first machines, which were able to communicate, but until the early 70' the only used interface were punching cards, then a text terminal. It changed nothing in development of virtuality. The concept was left the same, only the medium changed.
Examples of those interfaces differ from a DOS terminal to MUDs (Multi User Dungeons) or IRC (Internet Relay Chat).[7] At the beginning of 70' many foreseeing and courageous ideas of new interfaces have risen, but because of imperfection of hardware they were given up. It happened with model-based design method, which had to be left until 90'.[8]
Even in 2003 the most popular CAD application used by architects, AutoCAD, uses text interface supported by 2D graphics. It has still nothing to do with modern interface, and the level of virtuality stays the same, as it was 20 years ago.

2D GUI

The concept of Graphical User Interface (GUI) is very simple: 'A picture is worth a thousand words'.

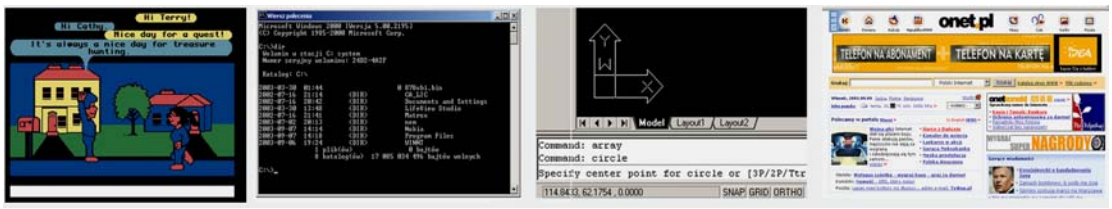

Figure 3: Examples of text interfaces. From the left: Habitat by Lucasarts – first attempts of making text interface more attractive, DOS-terminal, AutoCAD command line, interface of Web page

The basic components of first GUI were: windows, mouse and pointer, so it was called WIMP. Today it is enriched with digitizers, tablets, cameras, etc., but the rule is unchanged: 'picture imagery' replaced 'words-imagery'.
The first example of this type of interface is the famous Sketchpad, but they are everywhere – for example on the mobile phone's screen, at every Windows or Mac OS, at most portals of WWW.
How 'virtual' is that type of interface? It is interactive, but it has nothing to do with simulation. It is a convention, a way of representation, like the Egyptian figures. Easy to understand, but not trying to deceive the mind, not pretending the reality.

3D GUI

Three-dimensional GUI is a turning point in the described development. It is not a new idea – the ancient poet Simonides from Ceos invented a 'virtual map', which he built after reading the text. It helped him recall facts, as he placed them in never existing rooms, then walked through them.
Contemporary 3D GUI retained the idea of Simonides: human environment is naturally three dimensional, and simulation is very natural, human way of expression.
That is important step towards a virtual interface. Thanks to the power of contemporary VR tools 3D GUI is truly interactive, which can be seen even at simple simulation-games. There are still many problems to solve, as it is not fully immersive yet. VR technology cannot simulate smell, with much difficulty it takes off tactile stimuli, and still offers unsatisfactory quality. These problems are however only a question of time, and more important is the pure concept, which tries to create an artificial 3D world, redoubling (or augmenting) the real one. It is the essence of virtuality.
There are so many types of modern 3D interfaces, that only groups of devices will be specified. Generally they belong to VR devices: VRD, HMD, CAVE, Powerwalls, Virtual Motion Controllers, Motion Capture, Datagloves, Workbench, etc.
There are also some commercial, less advanced and cheaper examples. Everybody knows Formula I race simulators, millions of players use 3D virtual worlds, like Active Worlds, Blaxxun, or OZ Interactive, and many people use a 3D-designed web pages, which are fashionable and useful.

Experimental UI

3D GUI is not the last word in the interface development. Scientists all over the world work on it, however there is no single prevailing idea, but rather opposite and equivalent directions. Here are

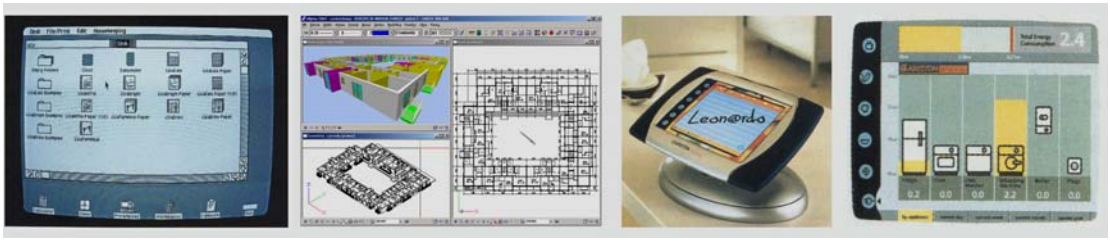

Figure 4: Examples of 2D interfaces – screenshot from Apple LISA 1983, interface of Allplan 2003, Leon@rdo by Ariston – system for management of appliances in domestic environment.

specified only three of them: (1) Intuitive modeling [9], (2) Field interfaces [10] and (3) Proprioception [11]. Their level of abstraction differs, therefore their 'virtuality' differs as well.
Intuitive modelling interfaces are focused on ease of use. Creation of models is natural, apparently invisible, although using different ways of expression. They are virtual in the technical sense, as ease of use and simulation both aim at immersion.
Experiments and visions of 'field' interface or proprioception belong to SF or a world of fantasy. They are philosophically 'virtual', as they offer potential possibilities, not being actual.

5. Conclusions

The screen and the keyboard are becoming too large for being a modern interface, therefore alternative researches are being undertaken. But examples described above speak for a non-linear development, rather than a clear evolution of interfaces. Three main ideas: (1) Dispersion, (2) Minimalisation and (3) Multimodality are interweaving. The reason is possibly quite simple – permanent investigating for a perfect medium, which will unify all types of interfaces and become fully 'virtual'. It is today neither Internet, nor VR. It has to be invented yet. When it happens, such a medium will offer changeable interface with abundance of possible solutions or interpretations, and simultaneously with possibility of perfect simulation. It will express the mutation of contemporary world, become the embodiment of 'augmented reality' and at the same time it will be completely invisible. [12]
Fully virtual interface is still virtual.

Remarks

1 Holzer J. (1994) [in:] de Kerkhove D. (1999), p. 48
2 like the one of Bill Gates [in:] Rajchman J. (1998); p. 117
3 Grosz E. (2001); p. 79, as well Gilles Deleuze - ……
4 Ibidem; p. 89,
5 "Augmented reality [in:] de Kerkhove D. (2001), p. 48, p. 59
6 "Stereoreality" " [in:] Virilio P. (1996) [in:] http://www.cyberhobbit.de/clairvoyant.htm
7 Siwak W. (1999) writes about visualization of IRC – first in 2D, then 3D
8 Gorczyca A. (2003), s. 41-42
9 Examples: Sculptor, xWords, theOtherSide (at ETH Zurich) [in:] Engeli M. (2001)
10 Examples: Anthony Dunne and Fiona Raby – "Bat Band Converter", "radiogenic architecture" (p. 114); Neil Gershenfeld (MIT) – recognition of electric field (p. 80) [in:] Gorczyca A. (2003)
11 Examples: Hans Moravec (p.280), Stelarc (p..265) [in:] Spiller N.(ed.), (2001) or Lars Spuybroek [in:] Spuybroek L. (2001)
12 According to Virilio the development of the world technology will happen through invisibility and gradual disappearance.

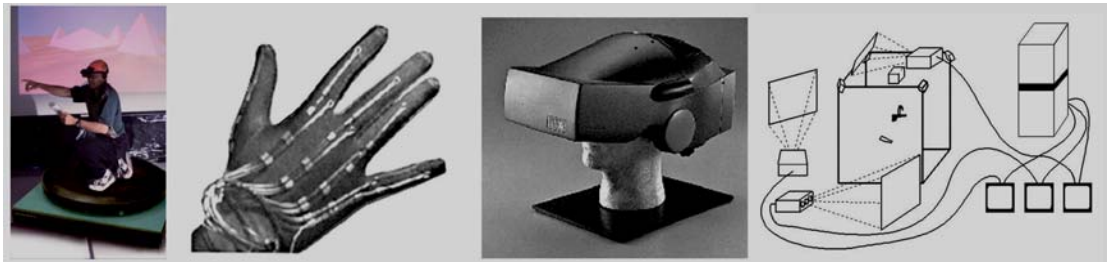

Figure 5: Advanced and expensive examples of 3D VR interface (from left) – VMC, Data Glove, HMD, CAVE. Simulation a 'possible' reality is a deception of human mind and senses

References
Engeli M. (2001), Bits and spaces, Birkhauser, Basel.
Gorczyca A. (2003), Interaction of the contemporary computer techniques with the design methods. PhD Dissertation at Faculty of Architecture, WUT
Green J.O. (1999), Nowa era komunikacji, Warszawa: Prószyński
Green M.,Shaw Ch, (1997), THRED: A Two-Handed Design System. [in:] Multimedia Systems Journal Volume 5, Number 2, March 1997, ACM/Springer Verlag.
Grosz E. (2001), Architecture from the outside. Essays on Virtual and Real Space, MIT Press
de Kerkhove D. (2001), The Architecture of Intelligence, Basel: Birkhauser
Lévy P. (1996), Second Flood. Report on Cyberculture. Council of Europe, Brusselles
Negroponte N. (1997), Cyfrowe życie, Warszawa: Wydawnictwo Książka i Wiedza
Rajchman J. (1998), Constructions, MIT Press
Sherman, Barrie and Judkins (1992), Glimpses of Heaven, Visions of Hell Virtual Reality and it's Implications; Hodder and Stoughton
Siwak W. (1999) Hipertekstualna podróż przez wirtualne światy [in:] http://physics.uwb.edu.pl/ptf/echa/w_siwak/wirtual/wirtual.htm
Spiller N. (ed.), (2001), Cyber_reader. Critical writings for the digital era, London:Phaidon
Spuybroek L. (2001), Informational Form [w:] ANC/Architecture and Culture, #0109, [in:] sarai reader 02 – the cities of everday life – p.243, an interview with Cho Im Sik
Virilio P. (1996), The Clairvoyant in the Age of Total Transparency [in:] http://www.cyberho-bbit.de/clairvoyant.htm
Virilio P. (1980), The aesthetics of disappearance, New York: Semiotext(e)

Figure 6: Everyday 3D interfaces (from left) – ETH Zurich web page, Teleporter – a gate to the AlphaWorld, InfoSpace (Jim Leftwich;1993)

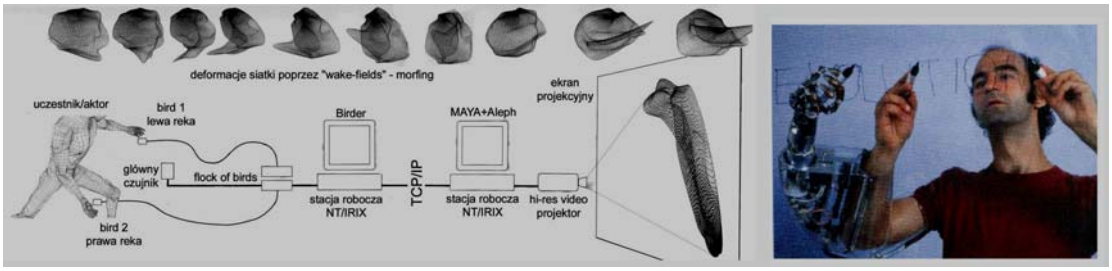

Figure 7: Experimental interface – the Otherside by Ferdinand Burgos (1999) and happening by Stellarc ('Hands writing'; 1982) as a literal example of proprioception