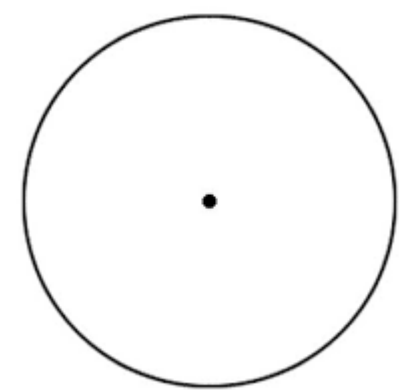


VR

PG3 online Nov 2020

Andrej Ferko @CU



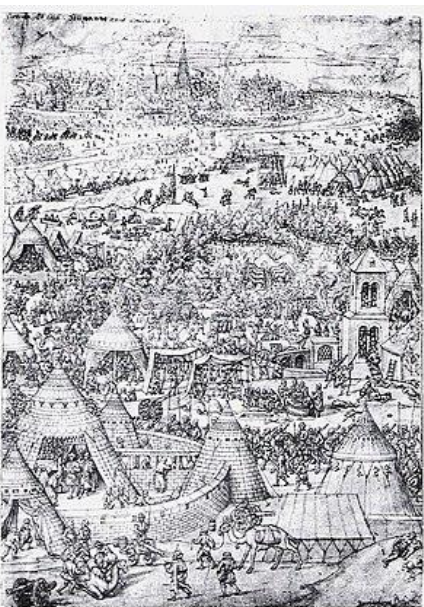


VR

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1. Scutum Sobiescanum, EU, 1683
2. "Lights in the night", USA, 1770s
3. Red Cliff, China, Winter 208-209



VR Notions Survey

- Artificial -> Virtual Reality, Virtual Environment, Synthetic World, Cyberspace (all contradictions)
- Augmented Reality, Mixed Reality
- Key Words (31, imagination, interaction, immersion)
 - Immersion
 - Interaction and Navigation, Avatar
 - Real-time
 - **System Answer Time: less than 0.1 s**
 - **Visualisation: at least 10 images/s**



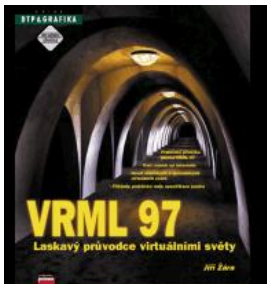
Questionable Definitions

- CG textbook by Salomon:
 - Model and display of real object
 - Animation
 - VR = Interacting with 3D animation
- Another VR definition:
 - Interactive computer system, creating illusion of 3D space



Standard Definitions

- John VINCE in Essential VR Fast:
- **Systems that create a real time visual/audio/haptic experience**
- VRML, X3D or another Standard VR language definition
- 2020: CZ Zara, SK Sobota-Hrozek, EN Brutzman
- <https://dcgi.fel.cvut.cz/LaskavyPruvodce/>
- https://hornad.fei.tuke.sk/predmety/svr/doc/SVR_ucebnica_v1.pdf
- <https://x3dgraphics.com/authors/brutzman.php>



VR Prehistory

- Neuromancer/Johnny Mnemonic novel/movie by W. Gibson ... (Matrix like dystopy), cyberpunk, CYBERSPACE...
immersion
- Ivan Sutherland, author of Sketchpad, (1965) The Ultimate Display paper, stereoscopic images 1968, prof. Brooks, ...
VR hardware and software
- Golem, humanoid, ROBOT... avatar
- The Garden with Forking Paths by Borges: virtual time



Matrix: dystopy

- Thomas Morus: Utopia
- Leonid Zamjatin: We (Russian)
- George Orwell: 1984, Animal farm
- The Brave New World

- Watching people, using lie, changing or erasing memory (Big Brother)
- Matrix has nothing new, except immersion



Virtual Interaction (Qvortrup)

- Virtual habitat = v-space + v-population
- How does one navigate in an with a virtual inhabited 3D world?
- How can the virtual world and the interface be the part of the same world?
- How can the use of these interfaces be supported by implicit narrative structures?
- How can the autonomous agents function as assistants to the end-user?
- How can the WYSIWIG be replaced by What you want is what you get?



Film Directing/1 Staging

- Film 5 channels – visual image, print and other graphics, speech, music, sound effects
- Mise-en-scene modifies space, montage modifies time
- Kuleshow effect – neutral face
- Mise-en-scene, staging an action, originally directing theatre plays – setting, lighting, figures, movement, appearance and costumes
- Goal – guide our attention across the scene, what we look at and when
- Overlapping planes, linear perspective, density gradients, relative size, height, aerial and vanishing perspectives, light, shadows, CG effects, p. 320
- 2020 addenda: best view, annotation, staging ~ Disney11



Film Directing/2 Cinematography

- Writing in the light
- Techniques of shot, p. 320, HOW the staged content/WHAT is being filmed
- Camera angles
- Depth characteristics of lens
- Pan, tilt, roll, zoom, tracking/dolly shot, crane shot, POV shot
- First person shot, subjective camera, 6 degrees of freedom with avatar
- Output is shot
- 2020 addenda: walk, fly, jump, repeat; avatar vs. autonomous agent; first/third person



Film Directing/3 Montage

- Relating shot-to-shot, putting together, p. 324
- Kuleshov effect
- Cut
- Double exposure, dissolve, fade in/out, iris in/out, circle in/out, wipe, swish pan, whip shot... Glassner CG&A 2003
- Editing is one of the most annoying aspects of WWW
- Interaction of qualities – graphic, rhythmic, spatial, temporal... Invisible cutting with seamless transitions
- 2020 addenda: cut/jump, 5 times, 2 pasts, vertical cut, e.g. pipe/Magritte, depth layers in Japanese>>US movies



Film Directing/4 Sound


- Sound can point to things of particular interest, p. 327
- Speech, music, sound effects, and silence 4
- Non-diegetic sound cannot be located in the scene, space, world, typically sound over, voice over
- Diegetic sound – actual sound, subjective sound, the voice of the narrator * on-screen/off-screen * synchronous/asynchronous
- Sound perspective
- Counterpoint versus parallelism
- There can be more than one sound
- Geri's Game signs, codes, meaning
- 2020 addenda: crossmodal effects, e.g. sound replaces image, levels of realism both in audio/video



Virtual Space (Qvortrup No. 2)

- Virtual habitat = v-space + v-population

Within philosophy the issue of space has a long tradition: is “space” something existing independently of human perception, or is “space” something which emerges from the way in which humans perceive or live in their environment? To understand this is of course essential if one wants to create virtual space simulations.

Qvortrup’s chapter is about cyberspace as something constructed and displayed in a virtual reality laboratory, that is as a 3D interface based on hardware and software construction tools and display facilities. He presents and defends a *phenomenological* understanding of cyberspace and of virtual reality. This implies that cyberspace should neither be perceived as a parallel world with its own ontology, nor as a photo realistic representation – a 3D image – of the real world. According to Qvortrup, cyberspace can be defined as a representation of human beings’  space experience.

Virtual Space (Qvortrup No. 2)



Finally, turning from the basic virtual reality techniques to the functional attributes of cyberspace applications three basic functional types are being identified:

- the reference function,
- the support function, and
- the parallel world function

These types can be systematized within the scheme of virtual reality semiotics as the iconic cyberspace functionality (that some cyberspace applications function as they do primarily because of their similarity with phenomena in the real world – as maps, distributed models, etc.), the indexical cyberspace functionality (that other cyberspace applications function as they do primarily because of their causal relationship to phenomena in the real world – as functional input–output devices), and the symbolic cyberspace functionality (that a third class of cyberspace applications function as separate worlds based on their own dynamic laws – e.g. aesthetic cyberworlds built on a set of social or artistic conventions).



Designing Objects+Places in 3D

• By Bonnie Mitchell

- VRML - Design in 3D
- Realism
- Abstraction and Stylization
- Balance
- Spaces to Explore
- Innovation in Space



VRML - Design in 3D contd.

- By Bonnie Mitchell

- reveal more information as the viewer navigates the space
- all views are fair game
- AF: model as DB or sea of images IBR
- AF: 4 modes = walk, fly, jump, repeat
- a still image placed on an HTML page, like the next one



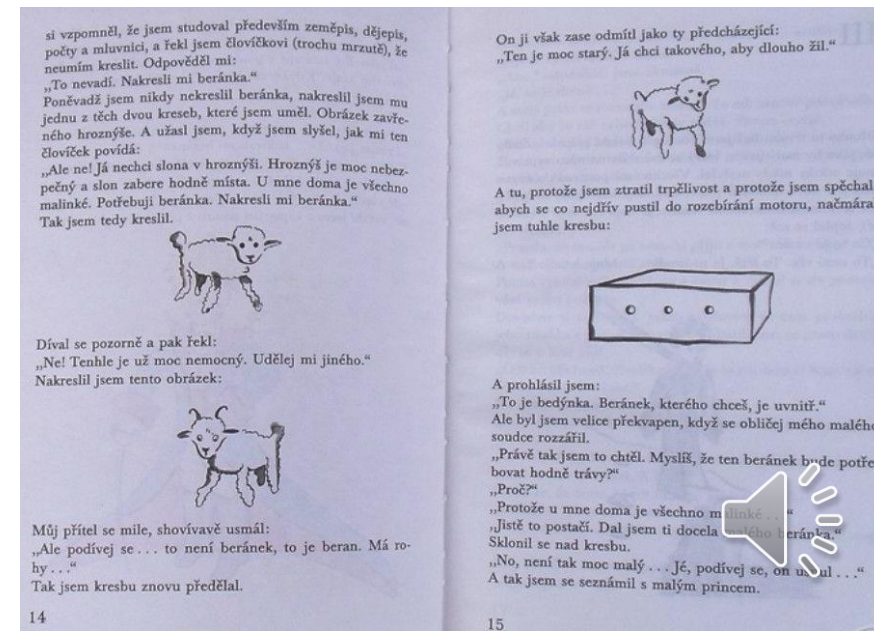
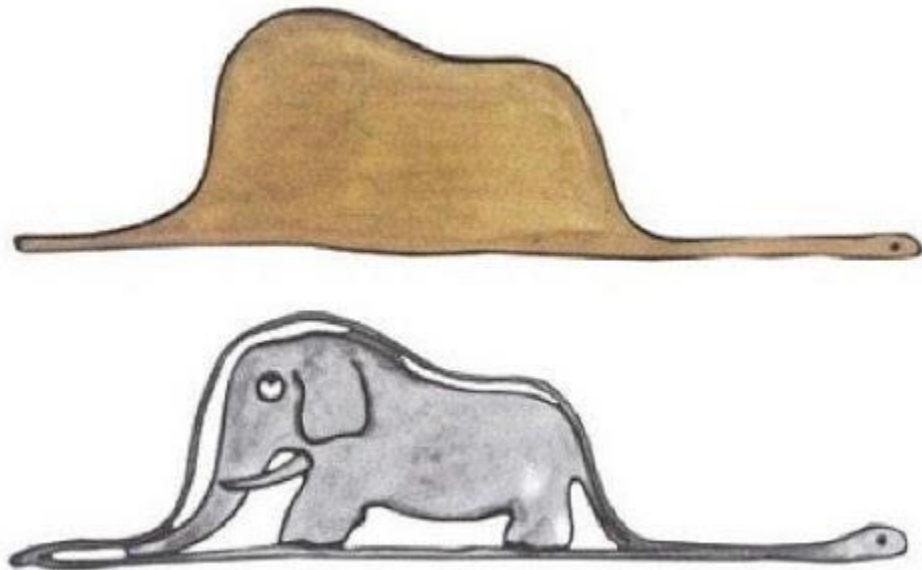
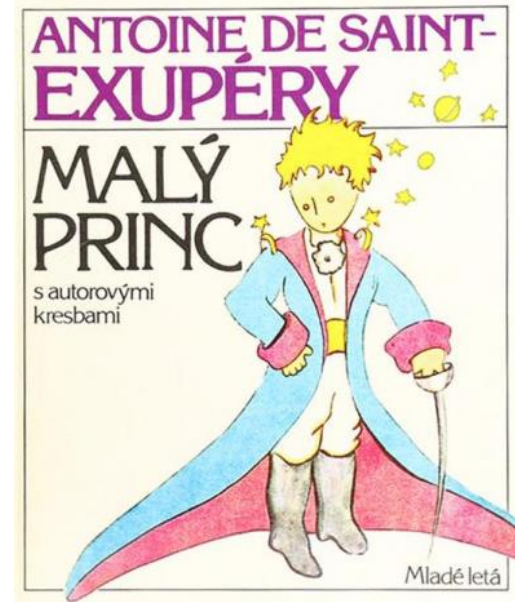
Virtual Population >> Cooperation

- Colony of virtual ants – Prado Museum



Philosophy...

- Virtual habitat = v-space + v-population
- Positivist understanding?
- Dualistic understanding? Qvortrup: phenomenology
- Best view? Worst view? StExupery:



Defining Population

- Virtual habitat = v-space + v-population
 - Population – living and dead things
 - Bot, autonomous agent, avatar
 - Autonomous agent has IQ (AI)
 - Avatar represents a user (youuser)
-
- In virtual museums: people, things, environments
 - Physical space (laws), social space (norms), game space (rules)



Vedecká výstava Virtuálny svet 2012

Virtuálny svet 2012, AVION Shopping Park, námestie pred Giga Športom od 16. 1. do 19. 2. 2012



Virtuálny svet 2012

Myšlienky, kontext, tvorivé dielne a postery pre vedeckú výstavu **Virtuálny svet 2012** pod záštitou Doc. Milana Ftáčnika, spoluautora virtuálnej a primátora reálnej Bratislavy

Autori (abecedne)

BĚHAL, D. – BENKO, J. – BOŠŇÁK, D. – BOROVSÝ, P. – BREJOVÁ, B. – ČERNEKOVÁ, Z. – DADOVÁ, J. – DUŠKOVÁ, E. – ĎURIKOVIČ, R. – ELIÁŠ, P. – FABO, P. – FANO, M. – FARKAŠ, I. – FERKO, A. – FORÍŠEK, M. – FTÁČNIK, M. – GAŠPAR, D. – GAŽÁKOVÁ, S. – GAŽI, P. – HALADOVÁ, Z. – HAVERLÍKOVÁ, V. – HEVIER, D. – HUDÁK, M. – CHLÁDEK, M. – JANÁČEK, J. – JANÍK, P. – JANOUŠEK, M. – KOHANOVÁ, I. – KOVAČOVSKÝ, T. – KUBÍNI, P. – KUČEROVÁ, J. – KUNIAK, J. – LACKO, J. – LÚČAN, L. – LÚČNY, A. – MAJOR, V. – MARTINKA, J. – MIKOLAJOVÁ, K. – ONAČILOVÁ, D. – ONDERIK, J. – SAMUELČÍK, M. – SMOLEŇOVÁ, K. – STANEK, S. – ŠIKUDOVÁ, E. – ŠRÁMEK, M. – TÁTRAIOVÁ-DAŘÍLKOVÁ, K. – VALÚCH, D. – VARHANÍKOVÁ, I. – VINAŘ, T. – VYSKOČ, J. – ZACKOVÁ, Z. – ZIMÁNYI, M. – ŽIŽKA, J.

FMFI UK BRATISLAVA

1.20 Multimedialný kiosk pre virtuálne múzeum

Michal Fano, Andrej Ferko, Peter Kubíni, Stanislav Stanek, Ela Šikudová, Katka Tátraiová



Prvé slovenské virtuálne múzeum na výstave Nostalgia 2006. Museli sme ešte pridať papierik **Dotýkajte sa, prosím.**

Virtuálny svet 2012, AVION Shopping Park, námestie pred Giga Športom od 16. 1. do 19. 2. 2012

VIRTUÁLNY SVET

Vy, Matrix a Avatari v Bratislave!

Avion Shopping Park, od 16.1. do 19.2.2012

Jedinečná príležitosť vnoriť sa do virtuálnej reality vďaka spolupráci Avion Shopping Park a FMFI UK Bratislava na vedeckej výstave VIRTUÁLNY SVET.

Slávnostné otvorenie dňa 16. januára 2012 o 16:00.
(výstavu ovláda primátor reálnej a spoluautor virtuálnej Bratislavy doc. RNDr. Milan FTÁČNIK, CSc.)

Výstava nadväzuje na úspech vlnajúcej vedeckej výstavy FUSION-EXPO.
Viac na stránke výstavy www.virtuálny Svet.info.

V doobedňajších hodinách sprievodné programy pre organizované skupiny.
Robotačky, 3D modelovanie, Zmiešaná realita.
(Na sprievodné programy sa treba vopred zaregistrovať na stránke výstavy.)

Vyskúšajte si interakciu blízkej budúcnosti cez KINECT a vyhrajte ho na najkratšom filmovom festivale sveta ASAP.

Lietajte ponad virtuálnu Bratislavu.

Zasmejeme sa na vedeckých kreslených vtipoch?

DEŇ OTVORENÝCH DVERÍ nielen pre maturantov na **Fakulte matematiky, fyziky a informatiky UK v Bratislave** pod názvom „**VIRTUÁLNY SVET NA FMFI UK**“ **15.2.2012 poobede od cca 15:00 do 21:00.**
(Podrobný program nájdete na fakultnej stránke www.fmph.uniba.sk.)

Christmas Tree Case Study: Computed Tomography as a Tool for Mastering Complex Real World Objects with Applications in Computer Graphics

Armin Kanitsar^{||} Thomas Theußl^{||} Lukas Mroz[†] Miloš Šrámek* Anna Vilanova Bartrolí^{||}
 Balázs Csébfalvi^{||} Jiří Hladůvka^{||} Dominik Fleischmann[§] Michael Knapp^{||} Rainer Wegenkittl[†]
 Petr Felkel[‡] Stefan Röttger[‡] Stefan Guthe** Werner Purgathofer^{||} Meister Eduard Gröller^{||}

^{*}Austrian Academy of Sciences Vienna, Austria [†]Tiani Medgraph Austria [‡]VRV/vis Research Center Vienna, Austria [§]Department of Radiology University of Vienna

[†]VIS University of Stuttgart

^{||}Institute of Computer Graphics and Algorithms Vienna University of Technology

^{**}WSI/GRIS University of Tübingen

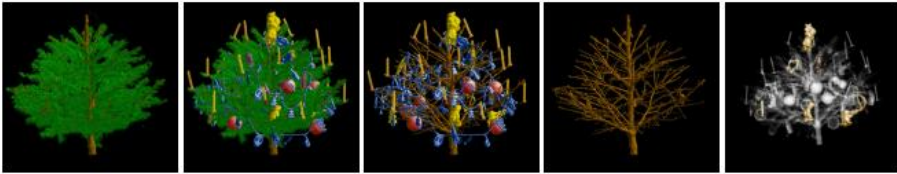


Figure 1: A short story: Before Christmas – the 25th – left for holidays – the sad end – Christmas tree in heaven.

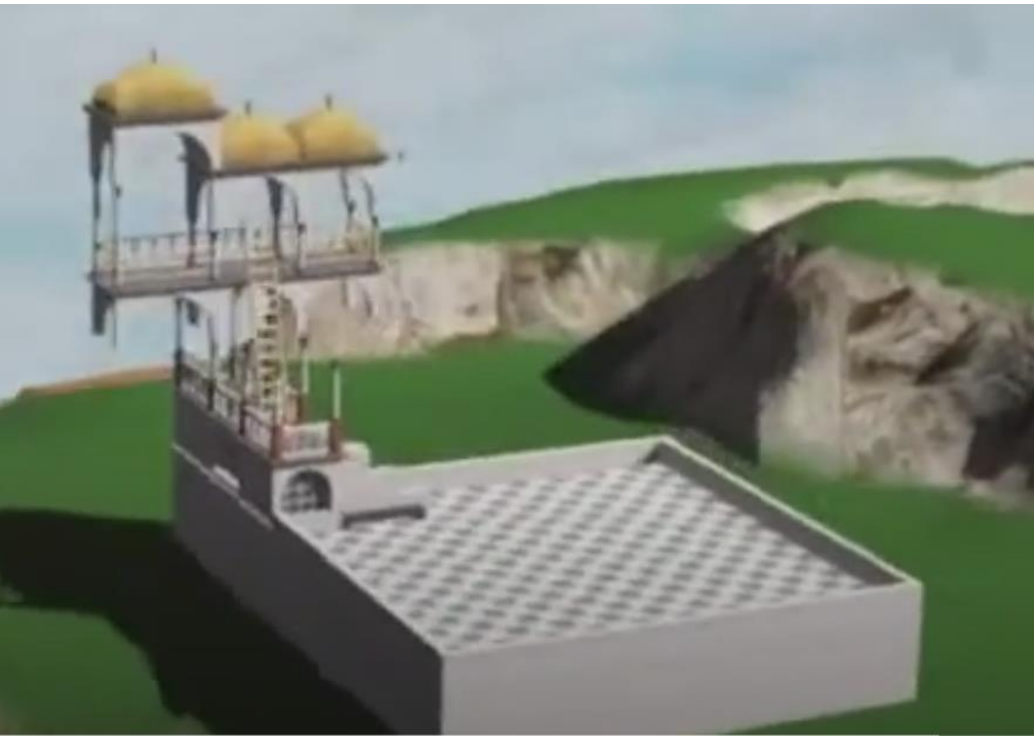
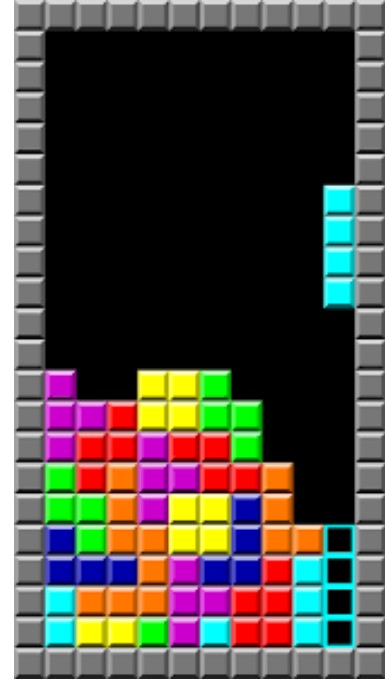
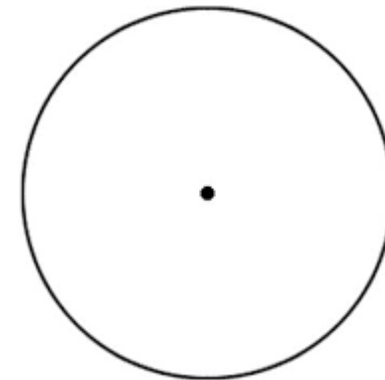
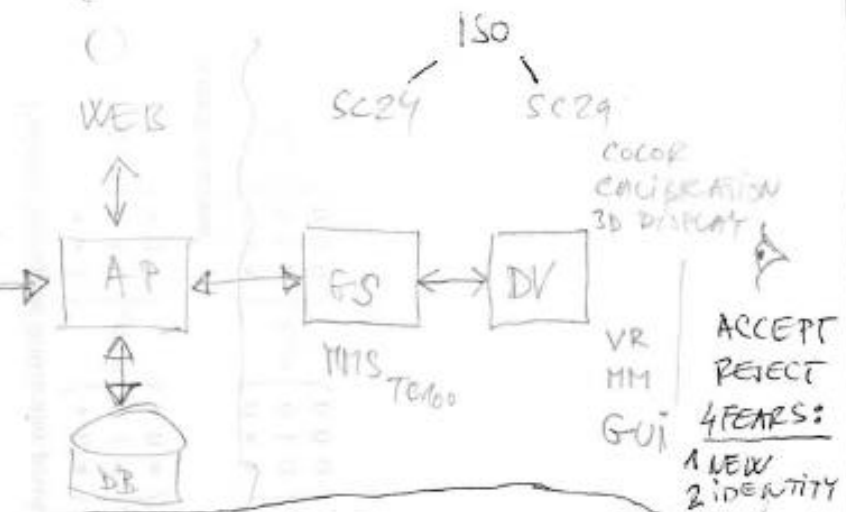
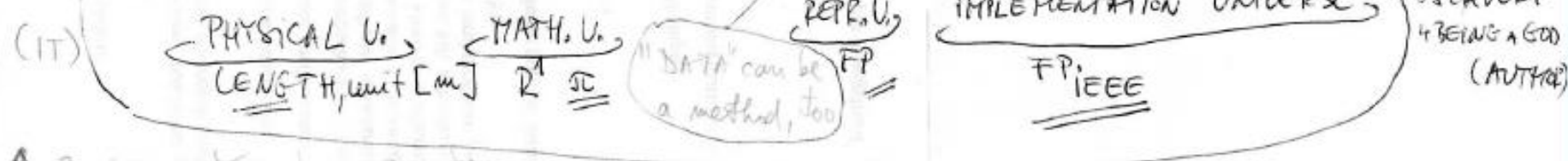


Fig. 1. In the tour of the HIV in blood plasma model we for example visit the capsid [B] which contains the genetic information of the virus. Besides the RNA, the capsid contains several important proteins, such as Reverse Transcriptase [C].





FOUR UNIVERSE PARADIGM



GLOBAL TRENDS

↑

zivotnost scd, predikov
překost a přesnost spracovavania (kompresia, optimalizacia...)
NORTHOTVORBA
TEORETICKA VYADAME UCECENEJ TEORIE

GRAPHICAL OBJECT $S \subset R^m$ (SUBSET)
function $f: S \subset R^m \rightarrow R^m$

LOCAL POSSIBILITIES

BSC s. 57 UPG-(M), GSV(I) (COMP. GEOM.)
REBOVSKA GRAFICKA
GEOMETRIA PRE GRAFIKOV (1), (2)
MODELOVACIE A RENDEROVACIE TECHNIKY
ROZPOZNAVANIE OBRAZOV...
REPREZENTACIE GEOMETRICKYCH OBJEKTOV
OpenGL, Multimedia...

- EXAMPLES:
1. LINE SEGMENT
 2. TERRAIN
 3. IMAGE
 4. VIDEO SEQUENCE

MGR
PH.D



IS 9001, software quality management

- 1. Unifying the technology and functionality
- 2. Functional specification
- 3. Prototype implementation
- 4. Completing the system
- 5. Validating the solutions
- 6. Dissemination of results
- 7. Evaluation and project management

- ... virtual museum methodology



VR

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