17. KONFERENCIA KOŠICKÝCH MATEMATIKOV, Herľany, 6. – 9. apríl 2016

QUESTIONABLE QUESTIONS

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What are the ellipse asymptotes?

One of questions

by Dr. Martina BATOROVA @ Comenius

ARTIFICIAL REALITY: Myron KRUEGER

ARTIFICIAL REALITY: Myron KRUEGER

The Fastest Proof of Everything

Hm… What to prove?

FERKO, A. 2014. " The Fastest Proof of Everything? " A Submission into the Le-MATH Project: Theatre Play writing competition on the theme of Mathematics. Pp. 166-170 in Manual of Scripts - Le-Math [online] http://www.le-math.eu/assets/files/Script%20Competition/MathScript.pdf . Competition Results, Honorable Mention. [online] http://www.le-math.eu/assets/files/Script%20Competition/Theatrical%20play%20writing%20competition-Results.pdf.

The Fastest Proof of Everything

Hm… What to prove?

Say, the existence of Lochness Monster.

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The Fastest Proof of Everything

Hm… What to prove?

Say, the existence of Lochness Monster.

Let ***E*** denotes „LM exists".

Let ***nonE*** denotes „LM does not exist".

Denote the probability of ***E*** by ***P***

Denote the probability of ***nonE*** by ***p***

FERKO, A. 2014. " The Fastest Proof of Everything? " A Submission into the Le-MATH Project: Theatre Play writing competition on the theme of Mathematics. Pp. 166-170 in Manual of Scripts - Le-Math [online] http://www.le-math.eu/assets/files/Script%20Competition/MathScript.pdf . Competition Results, Honorable Mention. [online] http://www.le-math.eu/assets/files/Script%20Competition/Theatrical%20play%20writing%20competition-Results.pdf.

The Fastest Proof of Everything

$$p < P$$

FERKO, A. 2014. " The Fastest Proof of Everything? " A Submission into the Le-MATH Project: Theatre Play writing competition on the theme of Mathematics. Pp. 166-170 in Manual of Scripts - Le-Math [online] http://www.le-math.eu/assets/files/Script%20Competition/MathScript.pdf . Competition Results, Honorable Mention. [online] http://www.le-math.eu/assets/files/Script%20Competition/Theatrical%20play%20writing%20competition-Results.pdf. **QED**

Two WARNINGS !!!

$$p < P$$

FERKO, A. 2014. " The Fastest Proof of Everything? " A Submission into the Le-MATH Project: Theatre Play writing competition on the theme of Mathematics. Pp. 166-170 in Manual of Scripts - Le-Math [online] http://www.le-math.eu/assets/files/Script%20Competition/MathScript.pdf . Competition Results, Honorable Mention. [online] http://www.le-math.eu/assets/files/Script%20Competition/Theatrical%20play%20writing%20competition-Results.pdf. **QED**

What are the ellipse asymptotes?

One of questions

by Dr. Martina BATOROVA @ Comenius

What is interesting?

Question with no answer?

Strife?

Nonsense?

Rattleback???

How to define interestingness?

What is interes....

- ***Question with no answer?***
- ***Strife?***
- ***Nonsense?***

p < P

Asymptotes of a finite ellipse?

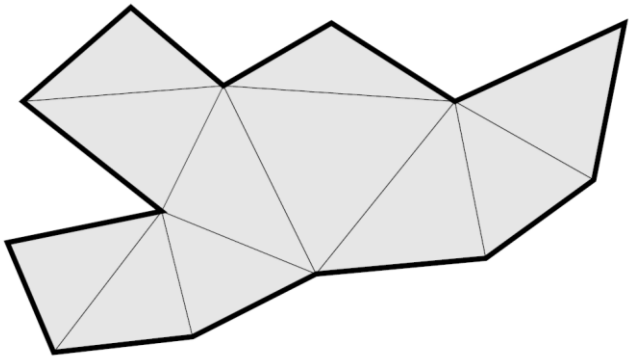
w to define interestingness?

WEGA/E-matikPlus

E-matik+, Kontinuálne vzdelávanie učiteľov matematiky

KEGA 094UK-4/2013, 2013-2015

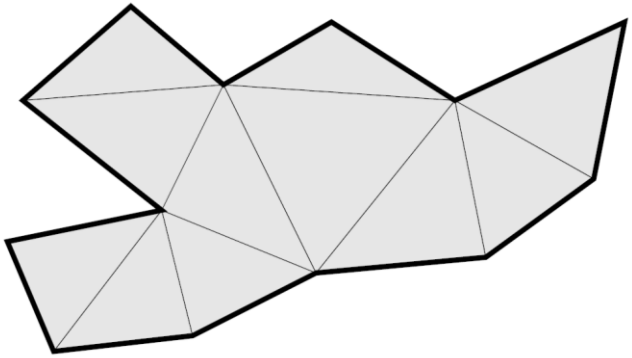
TRIANGULATE SIMPLE POLYGON



Ear, Empty

Not Empty

WHY? TRIANGULATE SIMPLE POLYGON

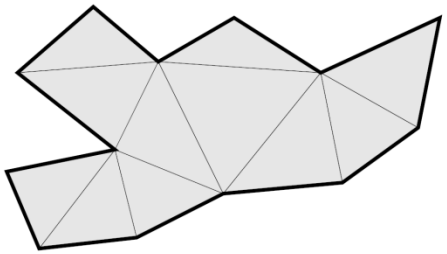


Ear, Empty

Not Empty

- Art Gallery Problem
- Edges in Star Constellations
  - Struve Arc 2,820 km, 24978: Sweden...

TRIANGULATING SIMPLE POLYGON

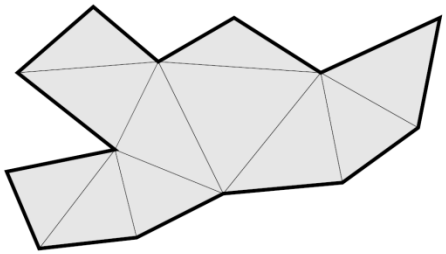


Ear Cutting

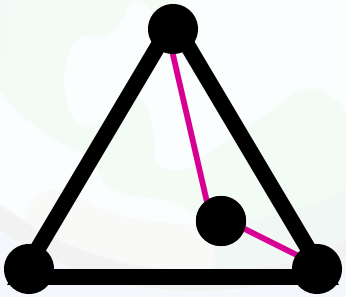
Not Empty

- Ear Cutting => Iteration
- No Ear Cutting => Divide & C.

TRIANGULATING SIMPLE POLYGON



Ear Cutting



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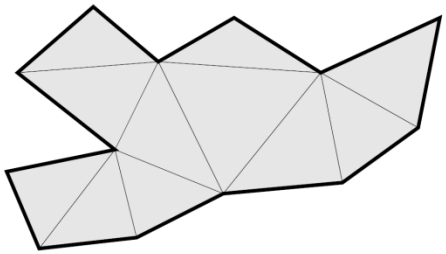
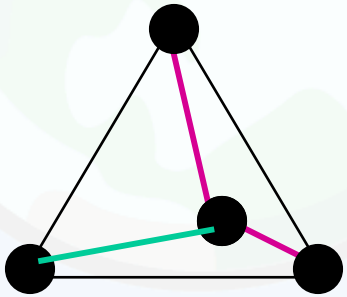
TRIANGULATING SIMPLE POLYGON

Ear Cutting



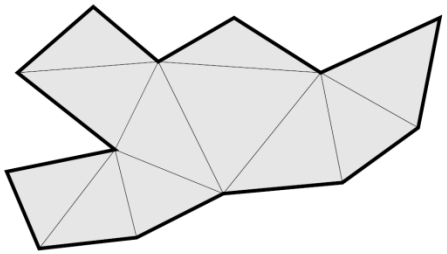


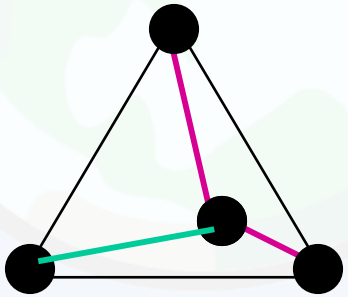
Not Empty

- Ear Cutting => Iteration
- No Ear Cutting => Divide & C.

No Ear Cutting => Divide & Conquer

METAPHOR!!!





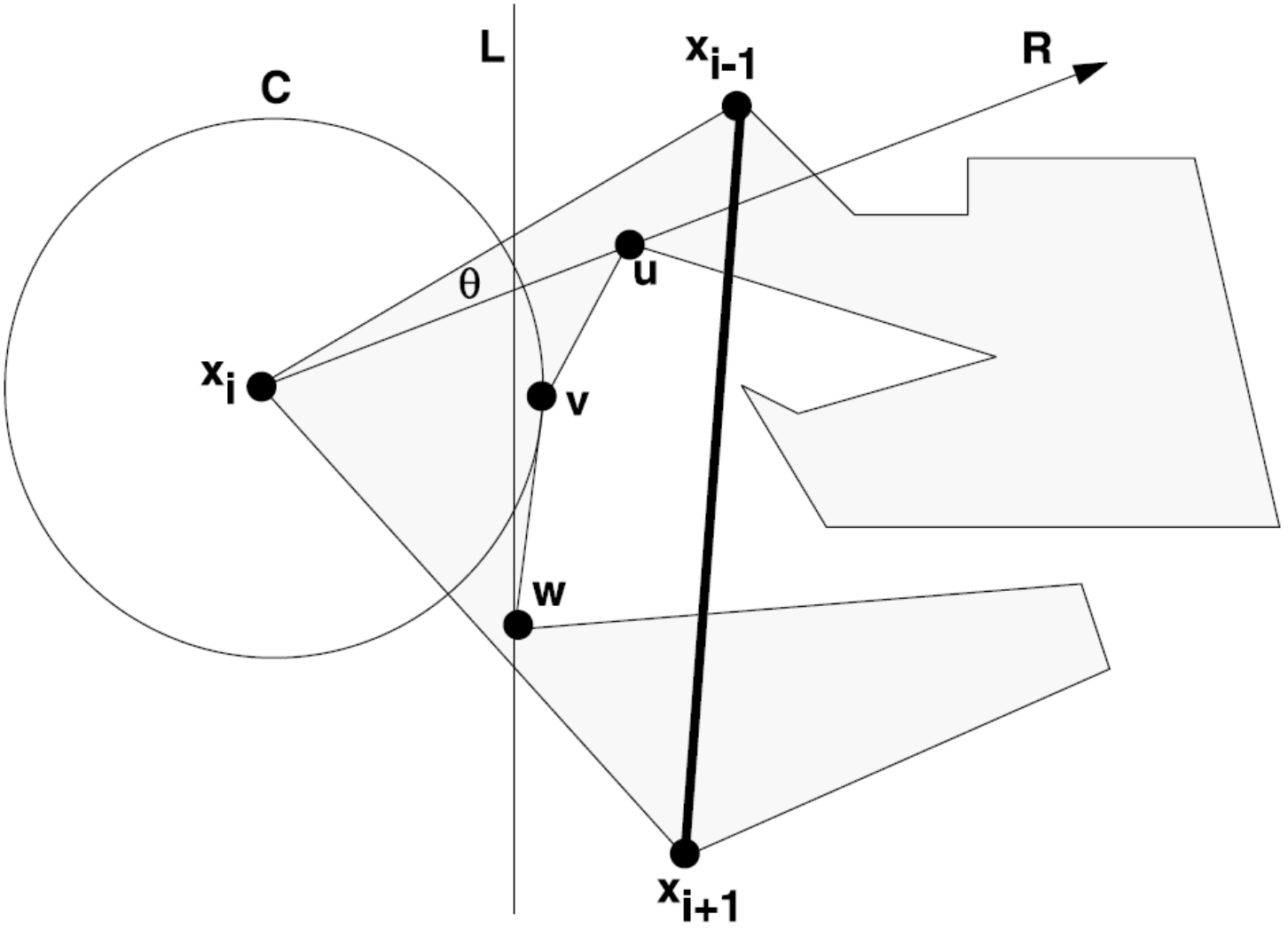
Not Empty

Polygon triangulation
Instance: A polygon with n vertices.
Problem: Find any set of triangles with the following properties:
– Each vertex of each triangle must be one of the vertices of the polygon.
– No two triangle interiors share a common point.
– The union of the triangles is exactly equal to the entire polygon.

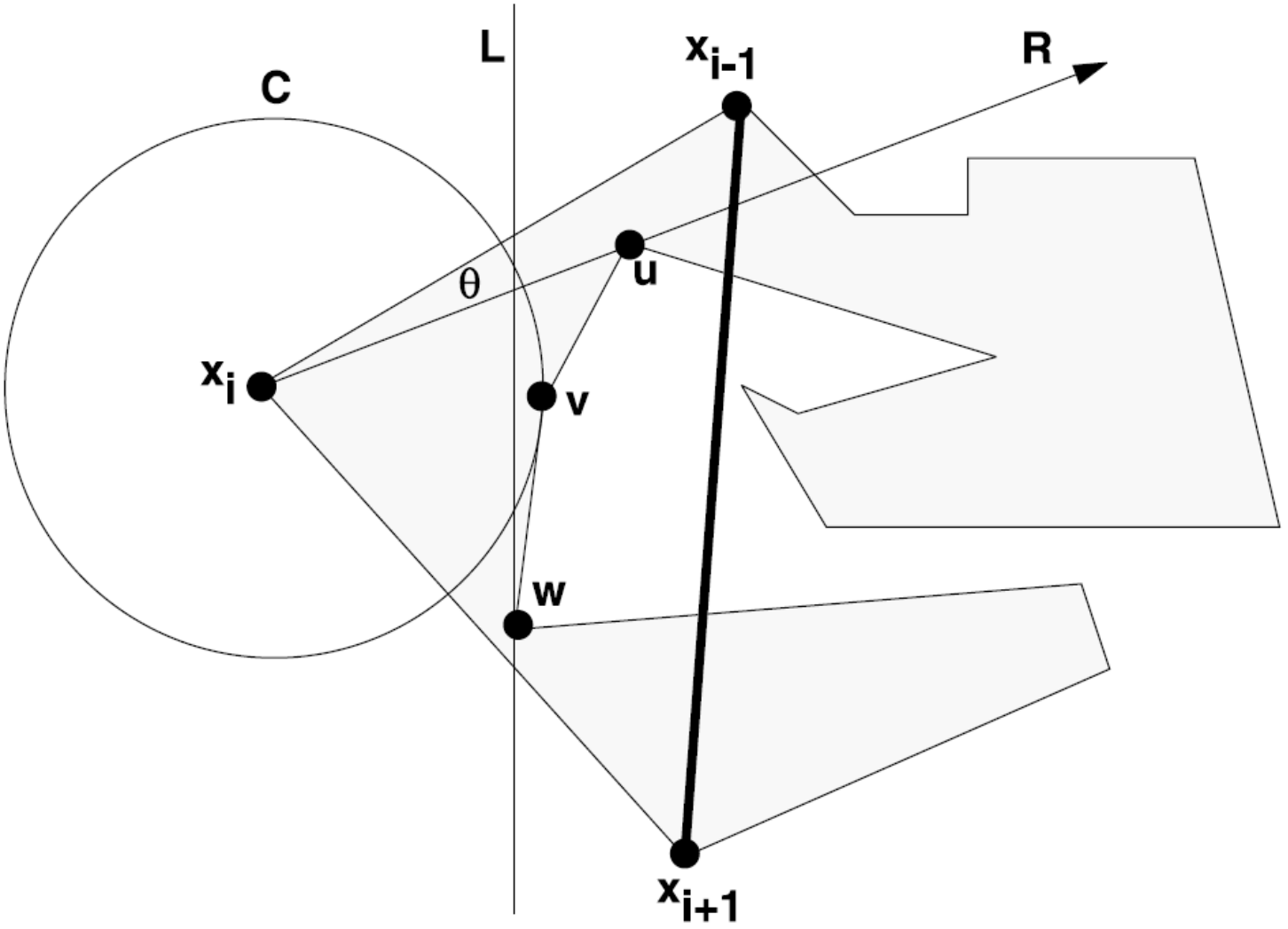
By induction, we can easily prove that any triangulation of any polygon with n vertices has exactly $n - 2$ triangles—provided that it exists. In the general case, the existence of a triangulation is far from being obvious.

Find ***n-3..2n-6*** edges

THREE METAPHORS

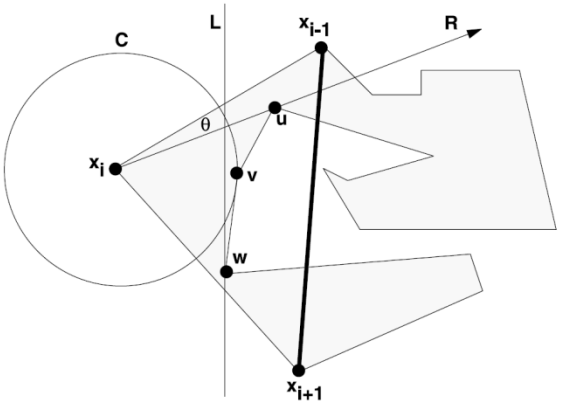


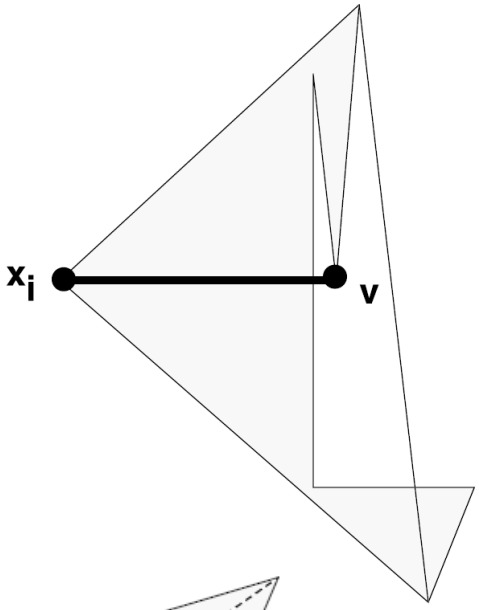
THREE METAPHORS

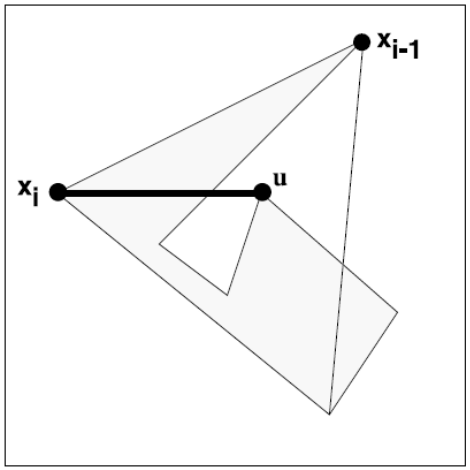


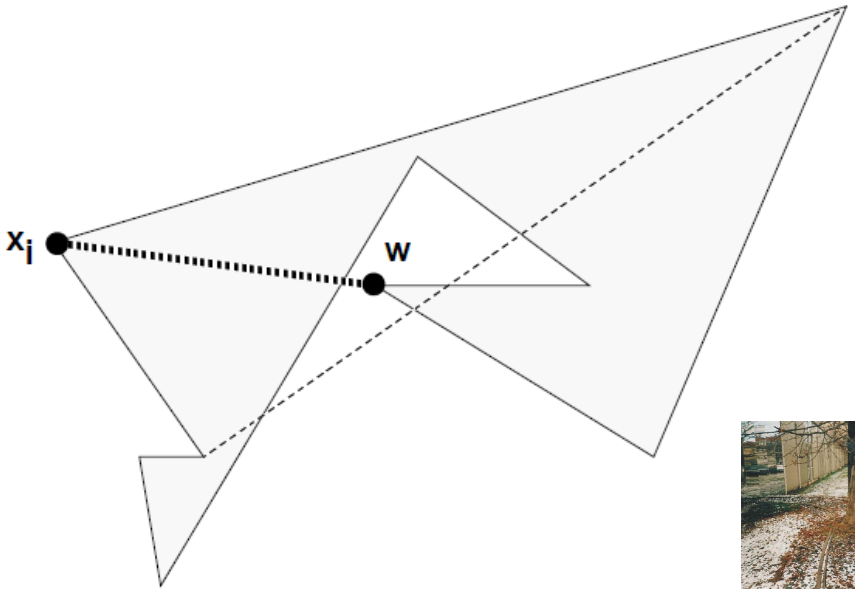
direct cognitive operations on tactile kinesthetic sense experiences

ALL THREE METAPHORS WRONG !









[SELLARES & TOUSSAINT] On the role of kinesthetic thinking in computational geometry.

Is there a CORRECT metaphor ?

METAPHOR (wooden board & nail it)

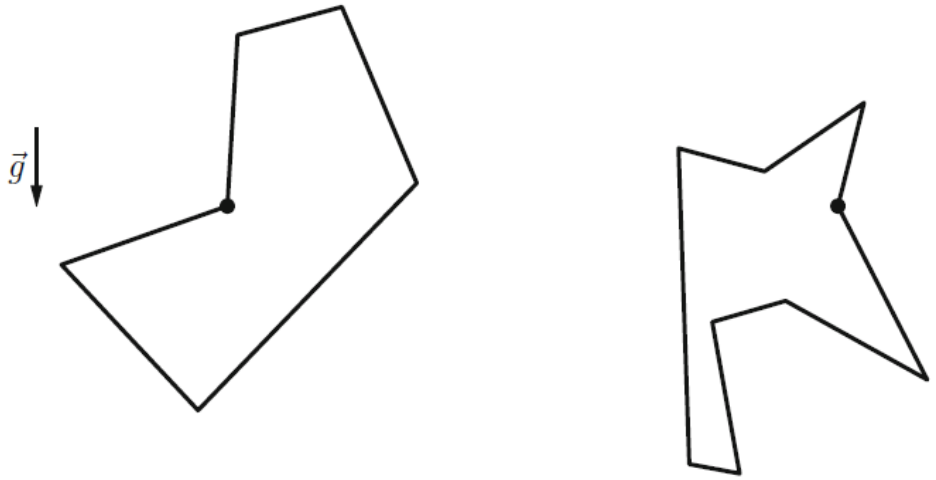
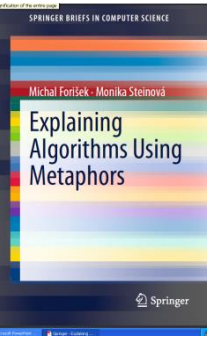


Fig. 3.24 Assemble *wooden board* to get the *boundary* of the *polygon*. Fix it on a *vertical wall* by a *nail* through a *concave vertex*



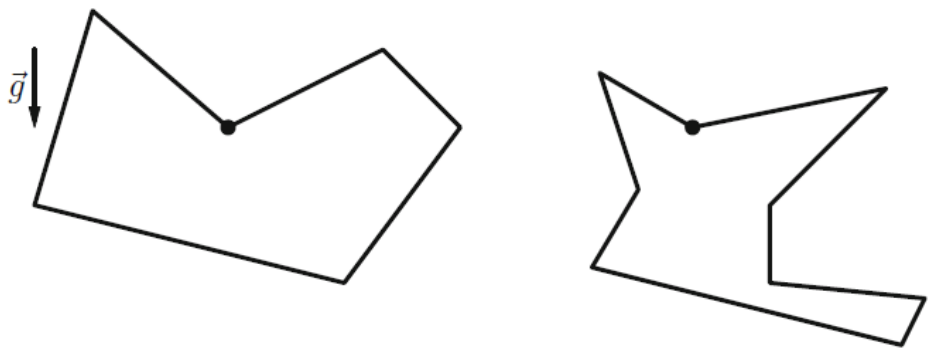


Fig. 3.25 Rotate the *polygon* so that the *edges* from the *nail point upwards* and *no edge* is *horizontal*

METAPHOR (lead ball & rubber band)

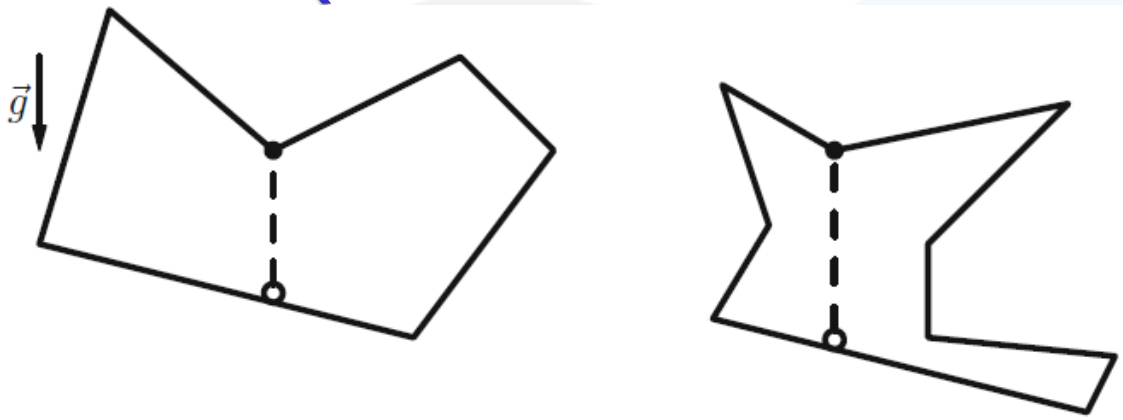
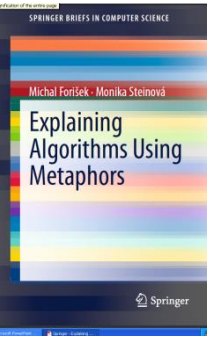


Fig. 3.26 Take a *lead ball* in the *end* of a *rubber band* and fix it in the *other end* of the *band nail*. Drop the *ball*. The *ball* falls *straight down* until it hits a *side*



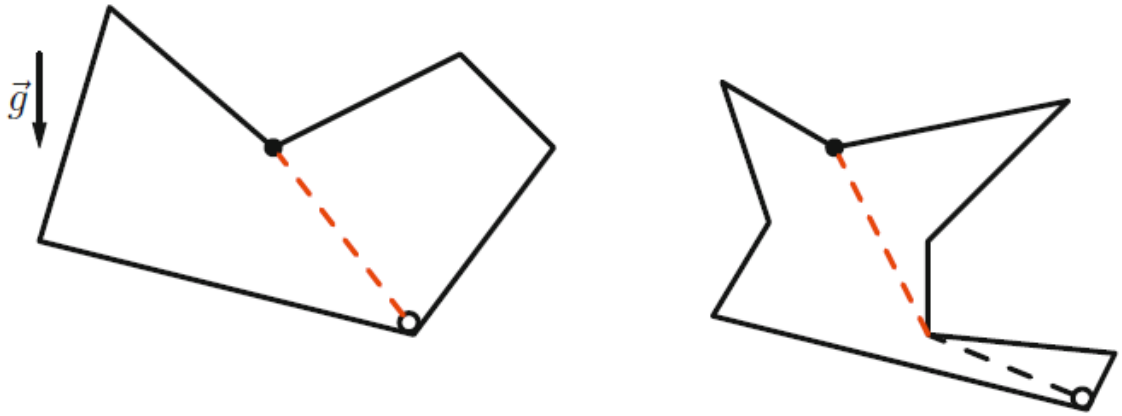
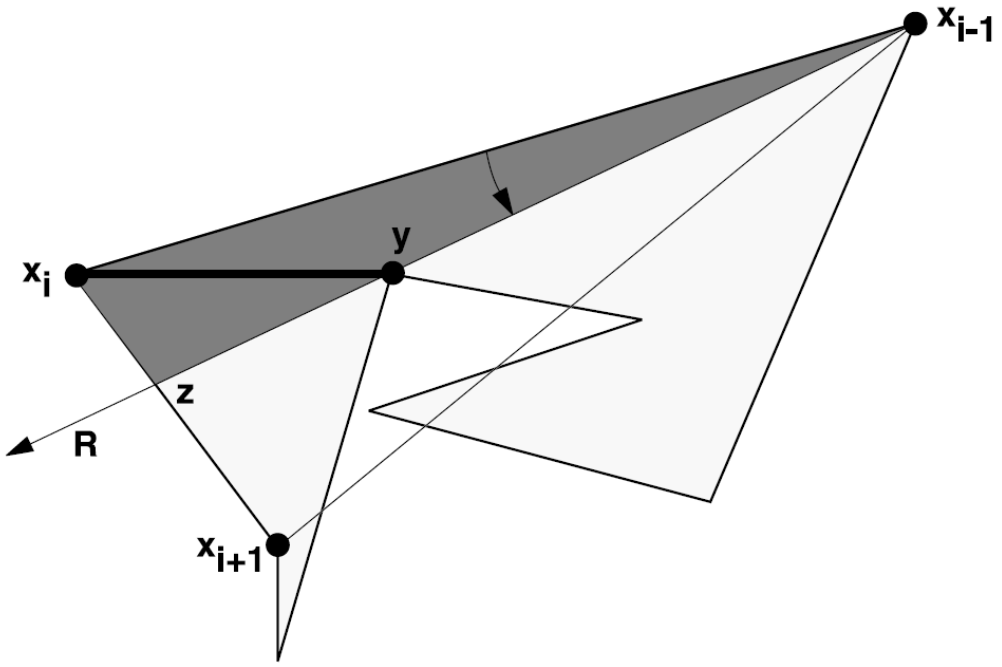


Fig. 3.27 Let the *ball* slide along the *side* of the *polygon* until it reaches a *vertex*

(Angular) SWEEP WORKS



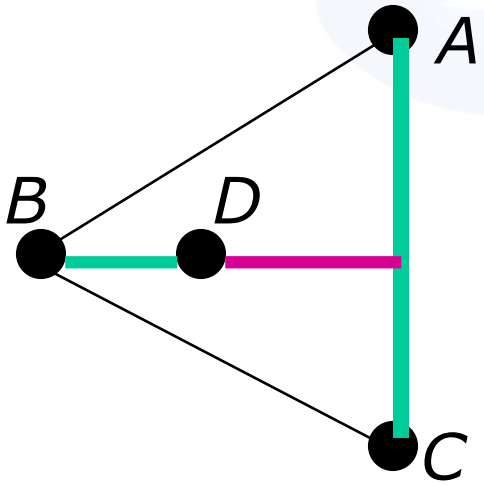
Ear Cutting

Not Empty

- Ear Cutting => Iteration
- No Ear Cutting => D&C, sweep…

(Linear) SWEEP WORKS

- **"Still, there is one other construction we want to mention due to its simplicity and ease of implementation:**
- **Let *B* be any *convex* vertex of the polygon, and let *A* and *C* be its neighbors.**
- **If *AC* is an inner diagonal, we are done. Otherwise, consider all other vertices that lie in the triangle *ABC* or on its boundary (there have to be some). Let *D* be the one that is the farthest from the line *AC*. Then *BD* has to be an inner diagonal.**
- **One of the reasons why we do not consider the above algorithm intuitive is the fact that the last step *cannot* be replaced by finding the point *D'* that is the closest to *B*. (Can you find a counterexample?)" [Forisek & Steinova]**

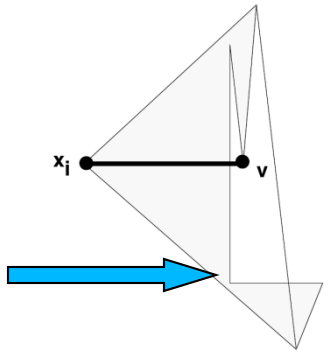


If D is both closest to B and the farthest from the line *AC,* OK.

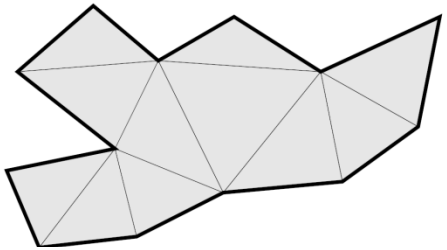
However, we know

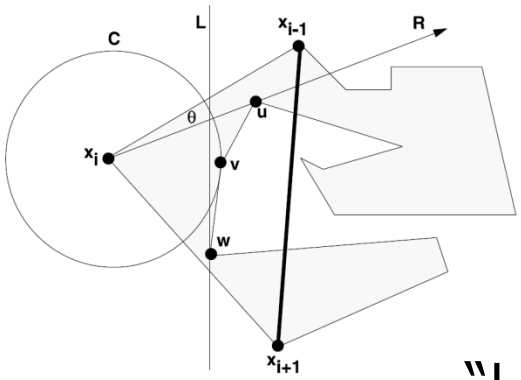
the counterexample already...

[Sellares & Toussaint]



TRIANGULATING SIMPLE POLYGON





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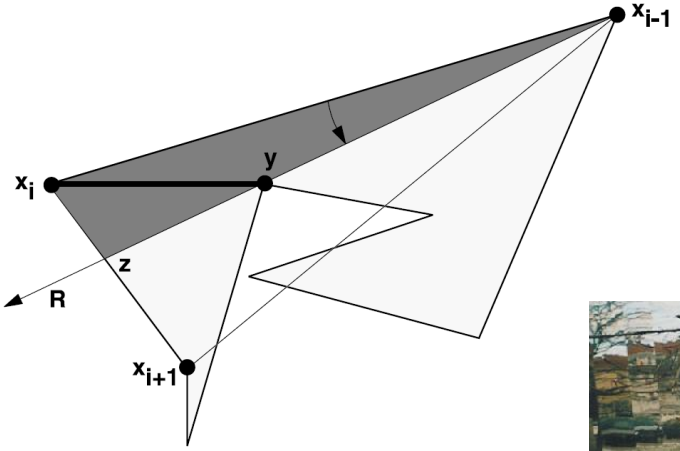
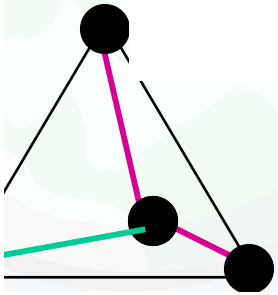
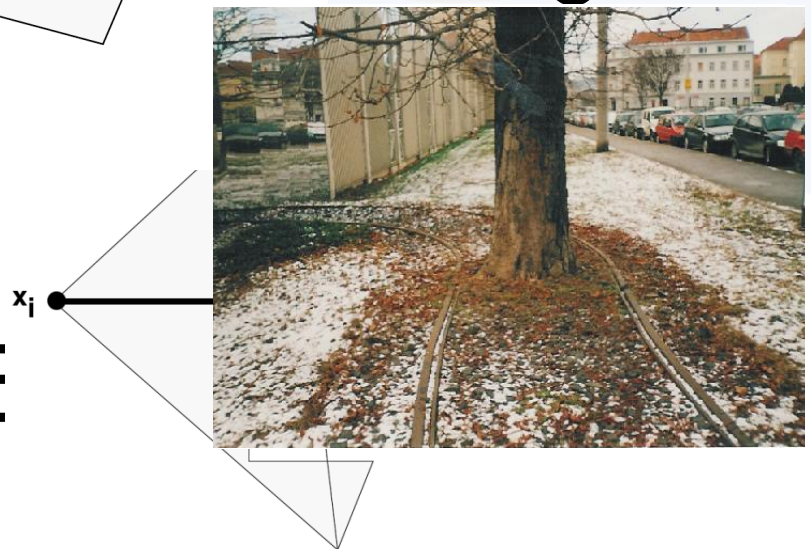


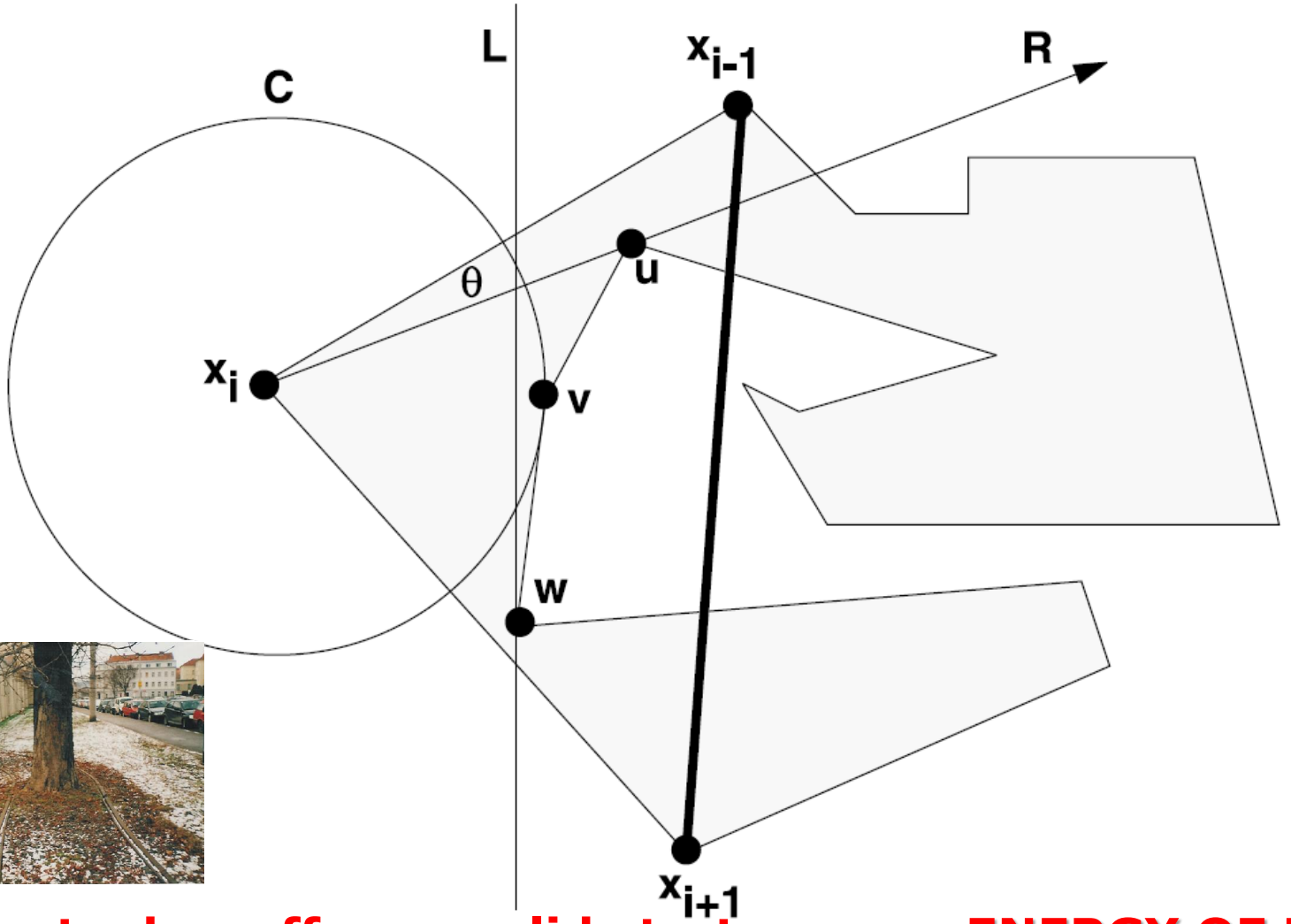




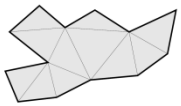
- Ear
- No E

"Later, a linear-time algorithm was discovered by Chazelle [4], but the algorithm is very complex and there have been some concerns about its complete correctness."

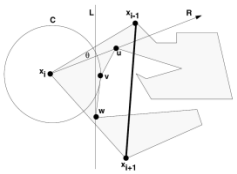
METAPHORS => Algorithmics



Wrong metaphor offers a valid strategy - - - ENERGY OF ERROR



METAPHOR, ANALOGY



Lakoff and Johnson [15] A (conceptual) *metaphor* is a cognitive process that occurs when a subject seeks understanding of one idea (the target domain) in terms of a different, already known idea (the source domain). The subject creates a conceptual mapping between the properties of the source and the target, thereby gaining new understanding about the target.

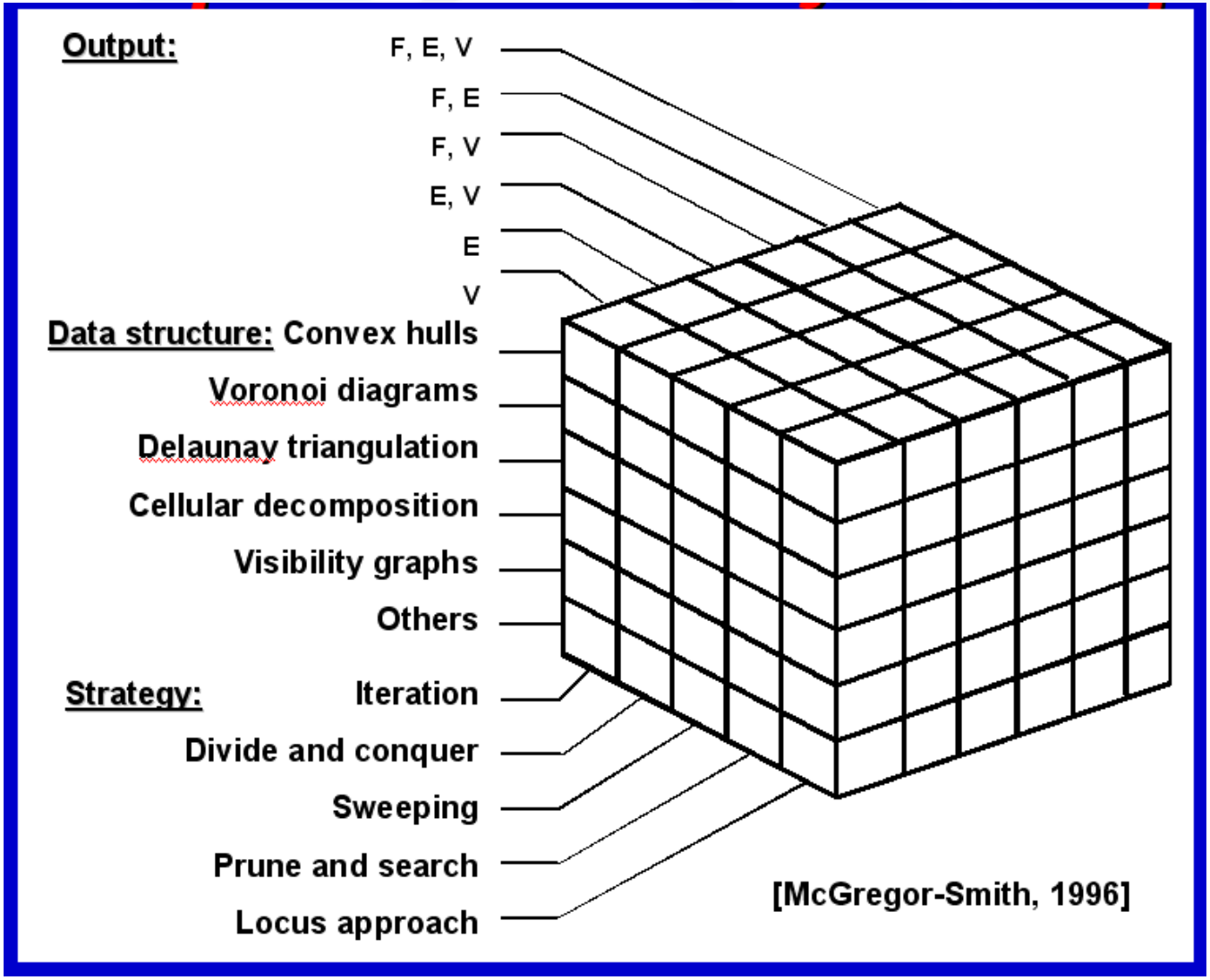
An *analogy* is a cognitive process in which a subject transfers information from one particular object to another. The word *analogy* can also be used as a noun describing the similarity between the two particular objects.

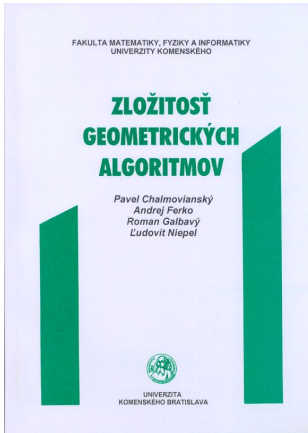
A sample analogy: CPU is *like* the brain of the machine *in that* it takes input data, processes it and produces outputs.

By our definition, every metaphor is an analogy, but not vice versa.

LAKOFF, G., JOHNSON, M. 2003. *Metaphors We Live By.* University of Chicago Press, Chicago.
FORIŠEK, M. & STEINOVÁ, M. 2013. *Explaining Algorithms Using Metaphors*, Springer Briefs in Computer Science.

CompGeom - 3 Ways to Explain





CompGeom Strategies, hm...

Strategy:

- Iteration
- Divide and conquer
- Sweeping
- Prune and search
- Locus approach

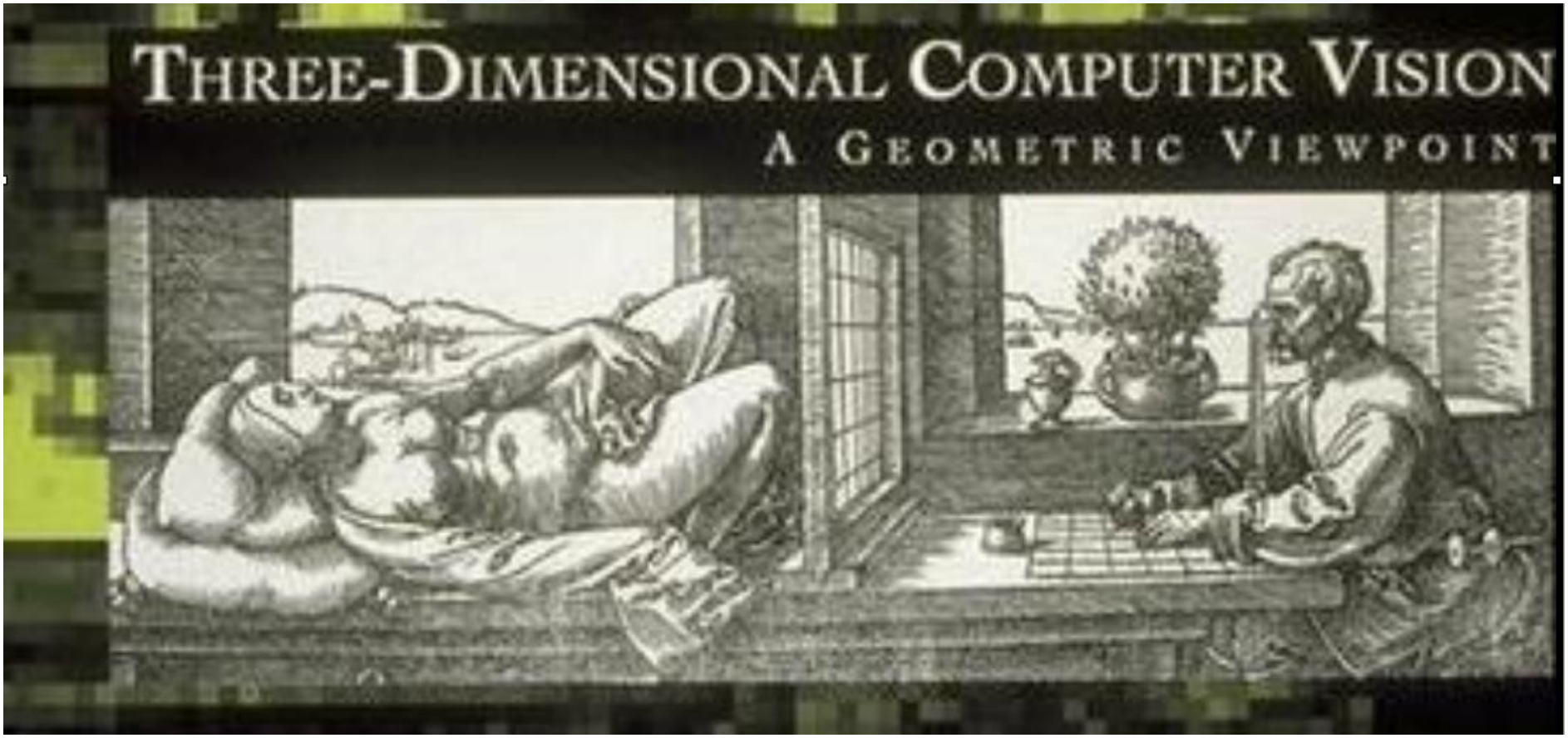
„Understanding how we learn

Students and teachers need a starting place for thinking about, and understanding, how they learn. Selfknowledge is a good start. How to get that selfknowledge? Inventories can be useful. Initially, it doesn't much matter which inventory we use. Why not? Because a learning style is not a set of scores on some inventory, or a set of alphabetic symbols, or paragraphs of descriptors with labels. A learning style is, rather, a description of a process, or of preferences. Any inventory that encourages a learner to think about the way that he or she learns is a useful step towards understanding, and hence improving, learning. VARK above all is designed to be a starting place for a conversation among teachers and learners about learning.“

http://www.johnsilverio.com/EDUI6702/Fleming_VARK_learningstyles.pdf

Iteration? Already Duerer!

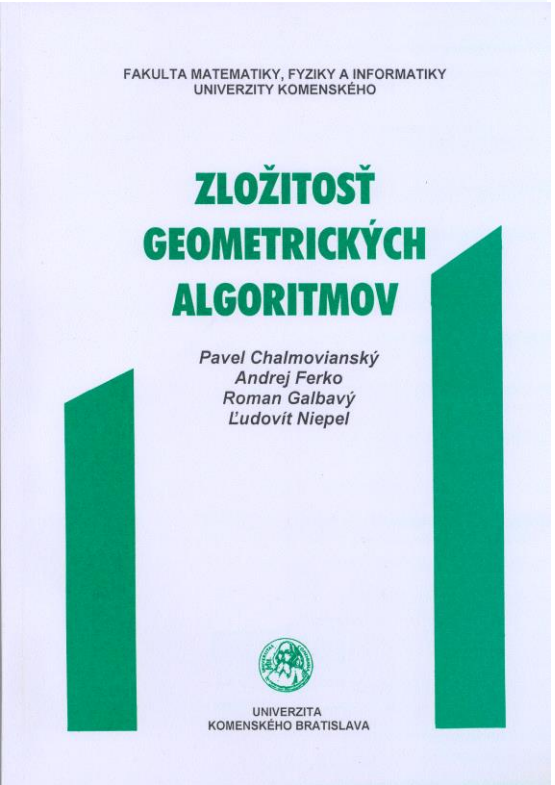
Strategy: Iteration —



Metaphors, Paradigms, Strategies, hm, hm, hm...

Strategy:

- Iteration —
- Divide and conquer —
- Sweeping —
- Prune and search —
- Locus approach —



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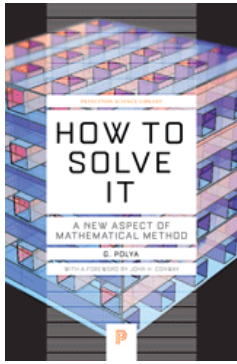
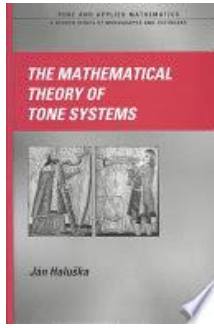
http://www.johnsilverio.com/EDUI6702/Fleming_VARK_learningstyles.pdf

Questionable Questions

- **Certain Questions** – POLYA, G. How to Solve It?
- E.g. Exchange data and unknown
- RASKAR's hexagon, How to Invent
- 6W's



- **Uncertain Ones**
- HALUSKA, J. 2004. The Mathematical Theory of Tone Systems. New York:Marcel DEKKER.
- E.g. find a strife, even a nonsense, unspecify, ambiguize



4 Universes + Interestingness

Interestingness, engagement, enchantment... WOW!!!

--- Presentation, NOW & HERE, GUI, HCI... ---

Implementation

Representation for computer

Mathematic model

Real world problem

[Velho et al.]

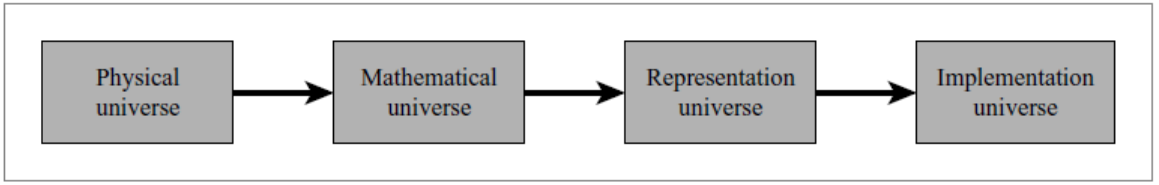


Figure 1.4: The four-universe paradigm.

Notions

- **Time, immersion, depth of immersion by Glassner**
- **Analyze a given minimalist example – done**
- **ICOM Definition of a Museum: A museum is a non-profit, permanent institution in the service of society and its development, open to the public, which acquires, conserves, researches, communicates and exhibits the tangible and intangible heritage of humanity and its environment for the purposes of education, study and enjoyment.**
- **Definition of a Virtual Museum by Qvortrup et al. - adding "telematic collection of multimedia..."**
- **Things, people, environments * Visualization, activising, hermeneutic sites ... 9 project options**
- **Real time – one past, virtual time – 2 pasts (author, user)**

Virtual time

- **Historically the first vision of virtual time after [Qvor02] can be found in J. L. Borges. His vision in the Garden of Forking Paths describes multiple times – branching, parallel and even crossing each other.**
- **Our case is much simpler, we deal with the linear (story)time. Even in this simplest case we have to distinguish two structures: event structure and discourse structure. Event structure in linear chronology is given by canonic ordering of events [Qvor01]. They can be presented in 1. canonical passage or 2. backward passage. There are three more possibilities 3. flashback, 4. flashforward and 5. embedded passage.**
- **We preserve the canonic ordering of events. On the other hand, the user can change the settings using his or her own navigation.**

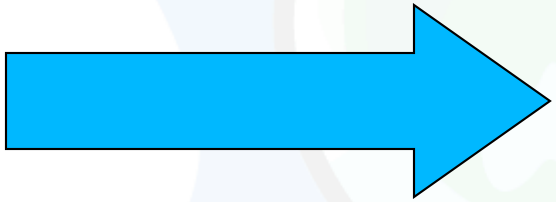
Virtual time has 2 pasts

- **We preserve the canonic ordering of events. On the other hand, the user can change the settings using his or her own navigation.**

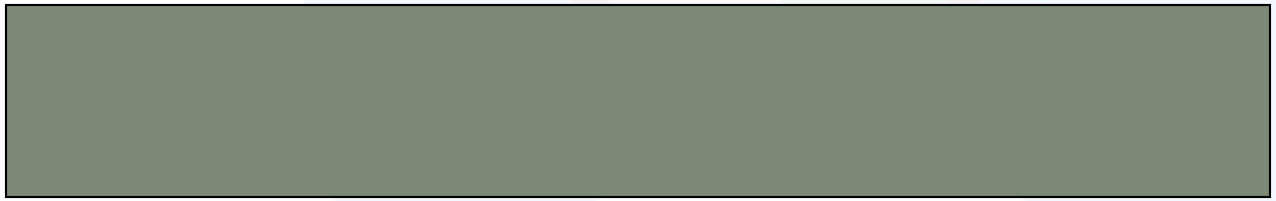
- **This way two past times are created (an event past in canonic ordering, and another event past in the sequence of user options). In other words, the past of events and the past of discourse may differ. From this point of view a virtual museum visitor creates his or her own version of the presentation [Came07].**

- **By the way, Qvortrup [Qvor02] cites a research, that the flashforward is the least understandable ordering from the above five options.**

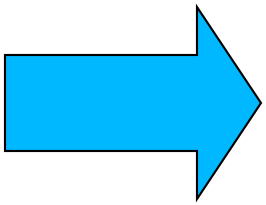
Virtual time ~ inverse river



Discourse Time

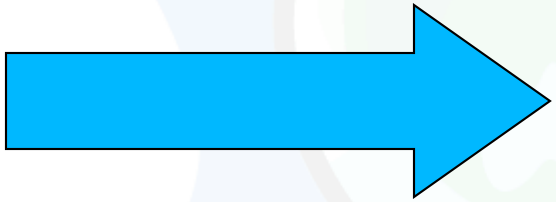


Riverside

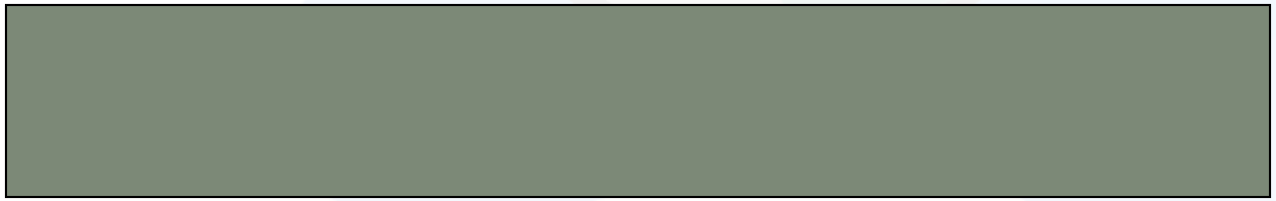


Event Time

One riverside, 2 streams



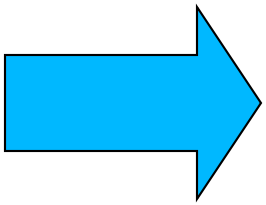
Discourse Time



Riverside

No time, just memory.

Gnomic time case.

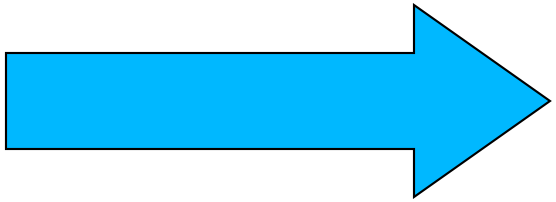


Event Time

Canonic Order Example

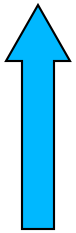
Presentation, Discourse

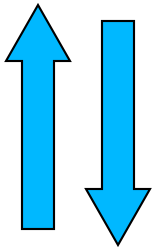
Memory



Authoring, Event Time

Four Universes





Output/input space

Graphics output primitives (e.g. triangle) **Input data record (e.g. location, string)**

Hardware/software layer (bits/pixels/inputs only, run time) NOW

Implementation for given hardware and software platform

Representation for computer (encoding, e.g. ASCII code, signed integer)

Mathematic model (or another conceptual model)

Real world problem (e.g. hunger by Berne: stimulus, time structure, contact, e.g. needs by Maslow: safety, selfactualization, transcendence)

VAR Big Picture K

Imagine, please, the user above this page and read it from the bottom line to this line, in a reversed ordering of lines. The user shares affective and cognitive responses, e.g. bisociation, hermeneutic gap filling…

VIS **<<< visualization… activization >>>** **HCI**

e.g. no clue, visible meaning or entymeme e.g. observe only or (inter)act

Uncertainty: unsure meaning, e.g. symptom, strife, misunderstood meaning, incomplete data or method not clear… like filtering

Depth of Immersion: e.g. curiosity, empathy, identification… like calibration

No story, no game Story Interactive Story Story and game Game Interactive Storytelling

Story environment: ostension, exposition, argumentation, description, narration or a move in the game (**game loop** 1..8)

1. **Observe, 2. Set goals, 3. Prepare, 4. Commit and execute**
5. **Compare against goals (and, eventually, stop)**
6. **Evaluate for self (and, eventually, stop)**
7. **Evaluate for others (and, eventually, stop)**
8. **Go to 1**

Visualisation metaphors **(Rhetorics)** **HCI metaphors**

e.g. cartographic map with weather forecast e.g. desktop metaphor, phone, walk, fly, repeat

Patterns recognized, e.g. visual rhyme, Propp function in a fairy tale, music motif

Semiotic layer: iconic, indexed, symbolic, signal, or symptom representation

Object space (user can pick an object and manipulate/interact with it)
Graphics (multimedia) objects with geometric support (shape) and characteristic function (color, sound)

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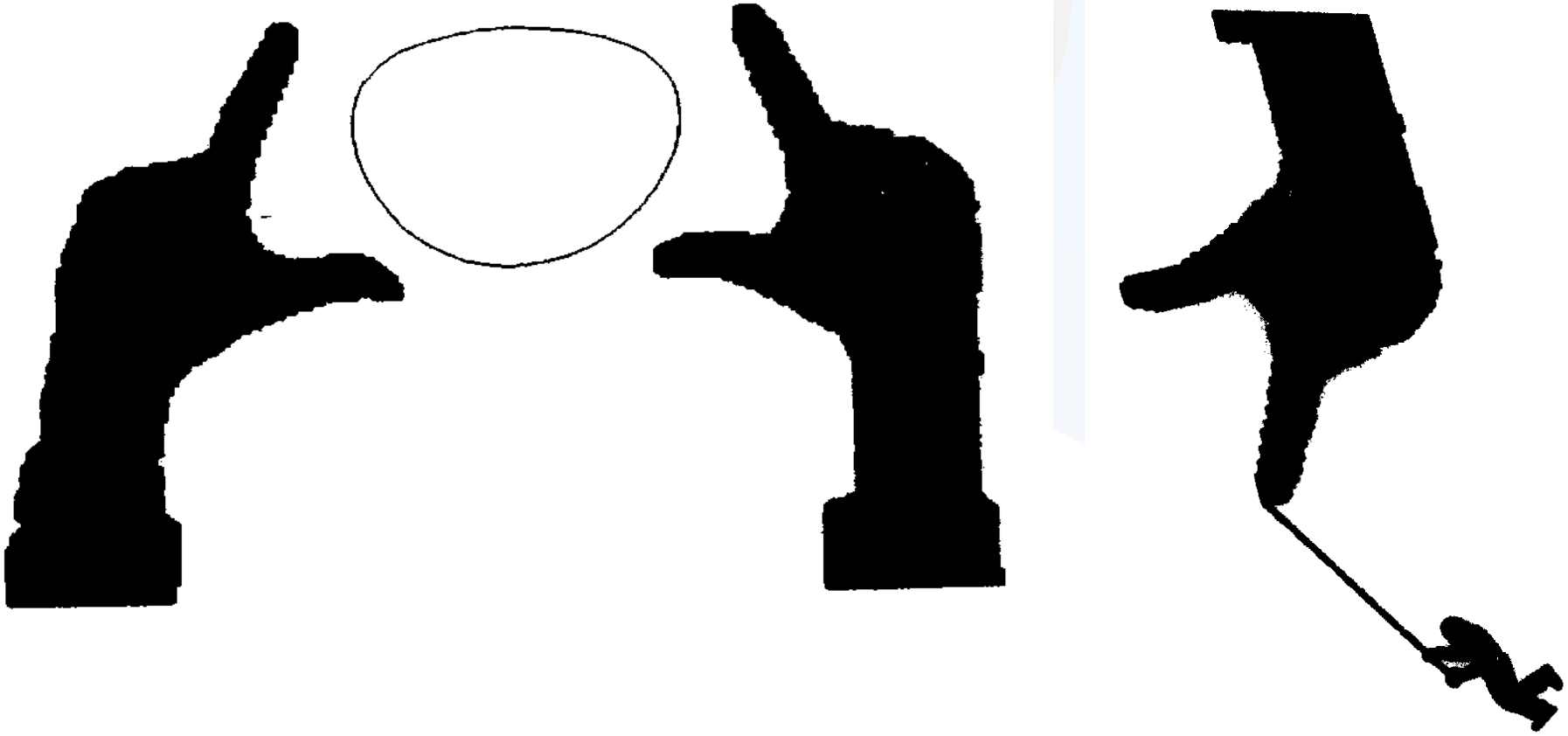
ARTIFICIAL REALITY: Myron KRUEGER

ARTIFICIAL REALITY: Myron KRUEGER

AR by Myron Krueger

- Interaction of participants… collaboration
- Interaction with the “world”



Defining Game (Play)

- J. Huizinga: Homo Ludens
- J. A. Comenius: Schola Ludus
- Marxists: just a preparation for work
- E. Fink: Oasis of Happiness
- A. Ferko: Behavioral Mirror

- Serious Games = 21. century school

Games & Stories => 16

- **The end of computer games**
- **A. Glassner: Interactive Storytelling, p. 205**

- **Social – individual**
- **Story – no story**
- **Computer – no computer**
- **Game – no game**

Many VEs

- **Virtual Space 8D xyztrgba**
- **Sound Space**
- **Social Space, Game Space (rules)**
- **Story Space (Glassner)**
- **Knowledgescape, mindscape, inscape**
- **No time problem => interestingness**
- **ECO (emotionally-cognitive overload)**

Time… hm…

- **Qvortrup… Borges… no sensor**
- **Everybody publishes, nobody reads…**
- **The answer is blowing in the data mining community only – 9 measures of interestingness**
- **Koestler? NLP?**
- **Virtual museums – engagement, enchantment – hermeneutic place**

How to define interestingness?

- **Koestler – AH, AHA, HAHA (HM…)**
- **Google, UNESCO, Webby awards, CPC…**
- **Genius loci, aura**
- **E.g. Virgin Tower @ Devin Castle**
- **Digital stories, intangible heritage**
- **Enchantment, engagement**
- **Visits/visitors*duration (engagement factor by Sherwood)**

A Better User Model

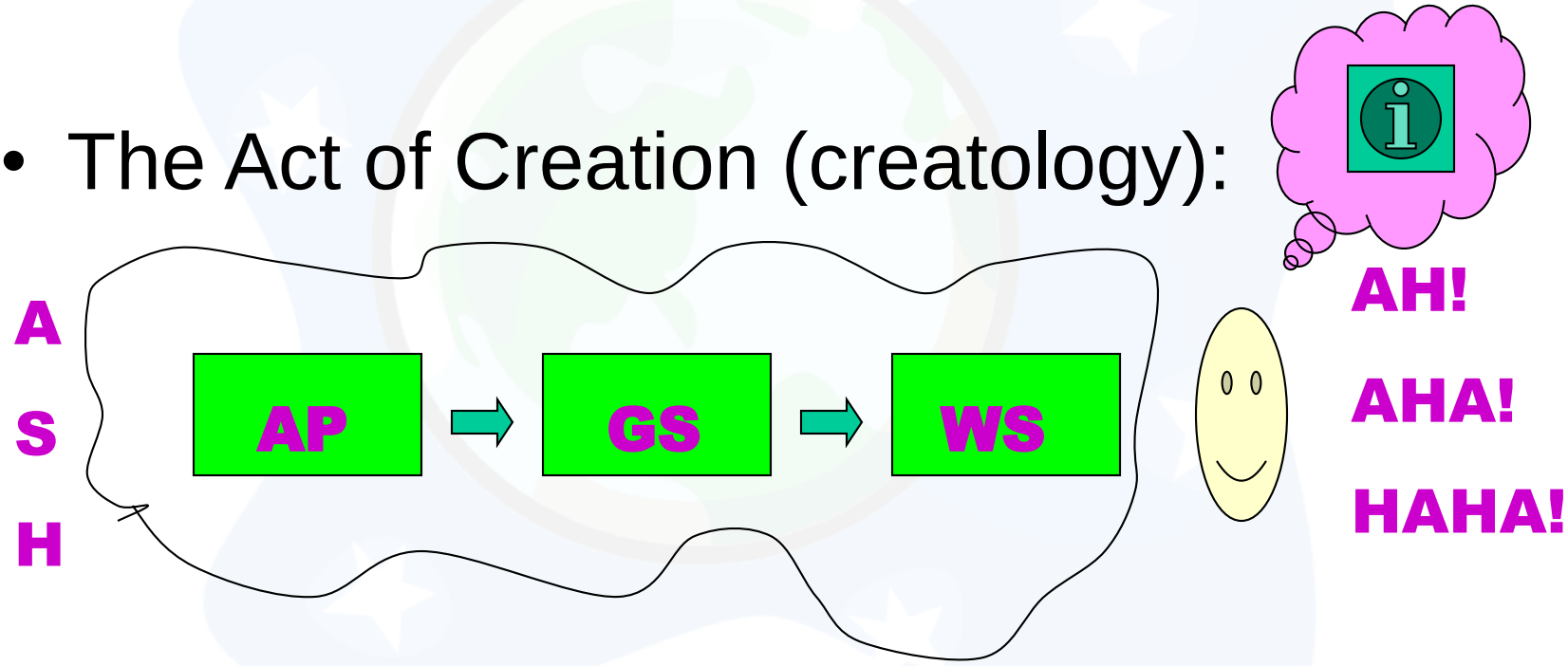
- **3 layers/personalities:**

- **Child, visual…**
- **Adult, symbolic…**
- **Parent, audio…**

Input data for all of them

Koestler

- The Act of Creation (creatology):



- Association >> bissociation
- Arthur KOESTLER: no labyrinth, no mouse, just bisociating two contexts

Interesting Undefined

- In the first step we define what means interesting and using this criterion we identify the world unique dataset.
- UNESCO – 700+, e. g. fujara, Vlkolinec
- Genius loci – phenomenology
- Virtual heritage – CIDOC CRM... digitalization… public participation

Genius Loci

- **Genius Loci = Spirit of the Place, LokalGeist?**
- **Etruscans – mundus, urbs, Roma**
- **Genius Loci ... Phenomenology**
- **NORBERG-SCHULZ, CH. 2000. *Genius Loci*.**
- **Implications (Hegel, Marx, Heidegger)**
- **Bogdan Bogdanovic in Vienna**

World Cultural Heritage

- **UNESCO**
- **700++ items**
- **30++ in AT, CZ, SI, SK, nearly no 3D models**
- **European added value is not added**
- **Digital preservation, documenting, publish...**
- **„... to enable Europeans to be consciously (and interactively) proud of their contribution to the World Cultural Heritage“**

Authoring Overview

- *1. Measure of interesting -> the world unique dataset*
- *2. Data -> collect and measure*
- *3. Processing -> secondary datasets 4 presentation*
- *4. Design and implement -> HW&SW 4 interactive projected virtual reality and for internet*
- *5. Organize -> digital content 4 presentation*
- *6. Integrate and verify -> the prototype*
- *7. Produce, publish & medialize -> the solution*

- *In the case of Povazske museum, we even replace by our virtual reconstructions the real museum during its real reconstruction.*

Kahneman: Thinking Fast+Slow

Characteristics of System 1

- generates impressions, feelings, and inclinations; when endorsed by System 2 these become beliefs, attitudes, and intentions
- operates automatically and quickly, with little or no effort, and no sense of voluntary control
- can be programmed by System 2 to mobilize attention when a particular pattern is detected (search)
- executes skilled responses and generates skilled intuitions, after adequate training
- creates a coherent pattern of activated ideas in associative memory
- links a sense of cognitive ease to illusions of truth, pleasant feelings, and reduced vigilance
- distinguishes the surprising from the normal
- infers and invents causes and intentions
- neglects ambiguity and suppresses doubt
- is biased to believe and confirm
- exaggerates emotional consistency (halo effect)
- focuses on existing evidence and ignores absent evidence (WYSIATI)
- generates a limited set of basic assessments
- represents sets by norms and prototypes, does not integrate
- matches intensities across scales (e.g., size to loudness)
- computes more than intended (mental shotgun)
- sometimes substitutes an easier question for a difficult one (heuristics)
- is more sensitive to changes than to states (prospect theory)*
- overweights low probabilities*
- shows diminishing sensitivity to quantity (psychophysics)*
- responds more strongly to losses than to gains (loss aversion)*
- frames decision problems narrowly, in isolation from one another*

*Feature introduced in detail in part 4.

What happens before AHA?

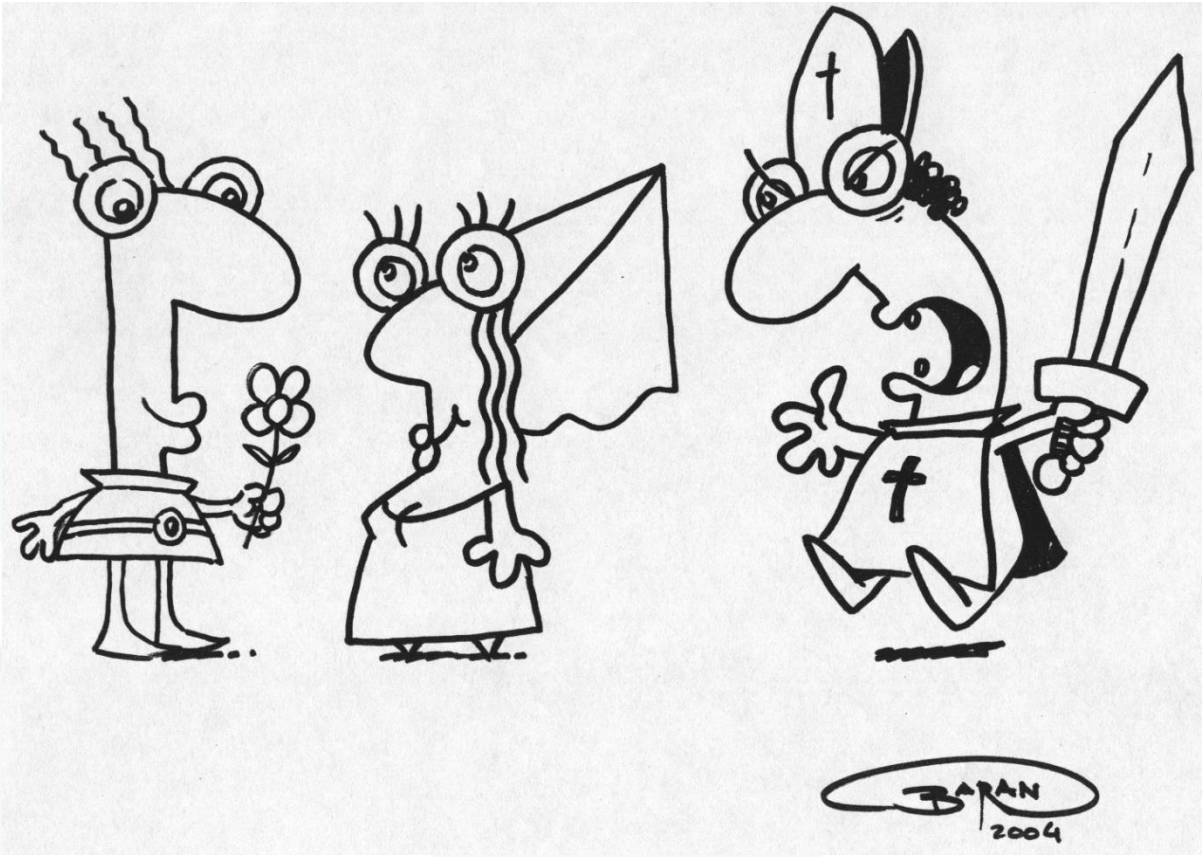
- Something pretty original now
- Appraisal theory:
- stimulus-arousal, adrenalin, interpretation
- When not sure with AHA => HM
- Self-observations here and now
- What about negative HM, levels of HM…
- H- (http! or towards M), hm-, hhh…, c-c-c, hmmm, mhm… aha, AHA
- BTW both H and M can be long and prolonged

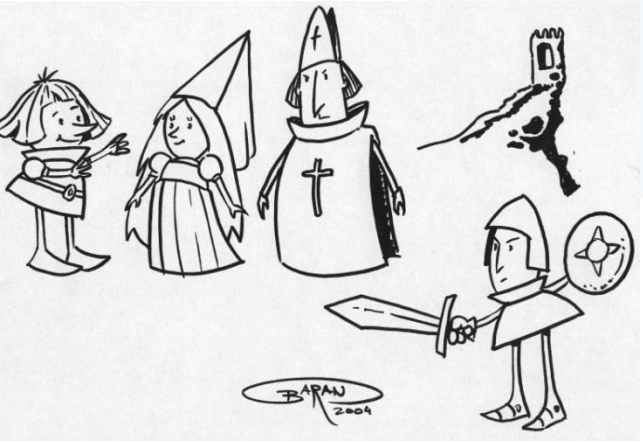
3D model by Kateřina Tátraiová

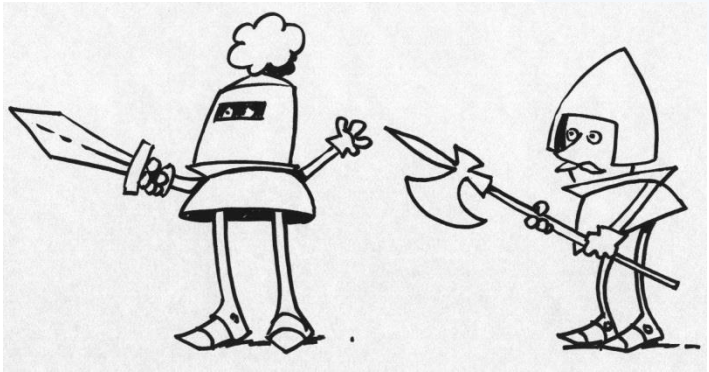
Prohibited love story Mária Ďuríčkova

- Rómeo&Juliet type
- Two lovers...
- ... and a bad guy (villain)
- No happyend: 2 graves at the output side
- She jumps into the cruel waves of the Danube river…
- “The most beautiful legend of Bratislava”

Animation by Jaro Baran







Desperate virgin jumping game

M. Novotny,
A. Mintal,
M. Matousek,
A. Ferko

Brhlovce Case Study

Diploma work, MSc. Thesis

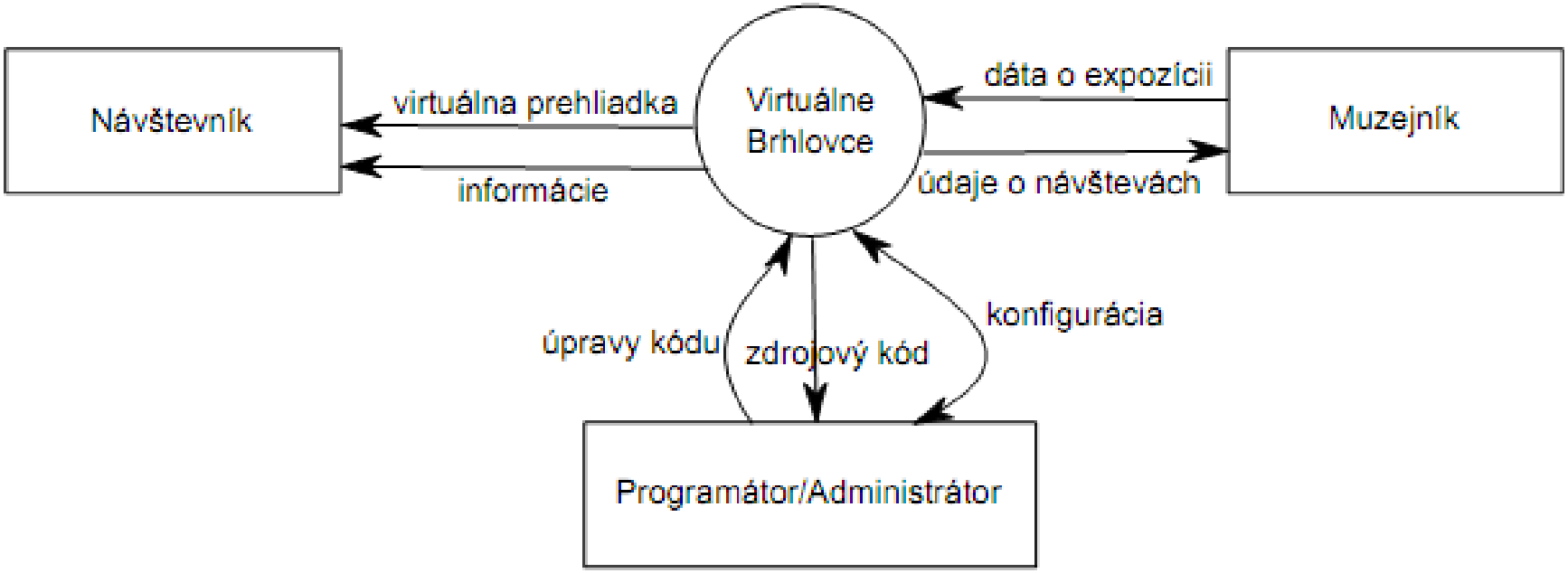
by Rastislav SVARBA

Brhlovce cave houses virtual museum

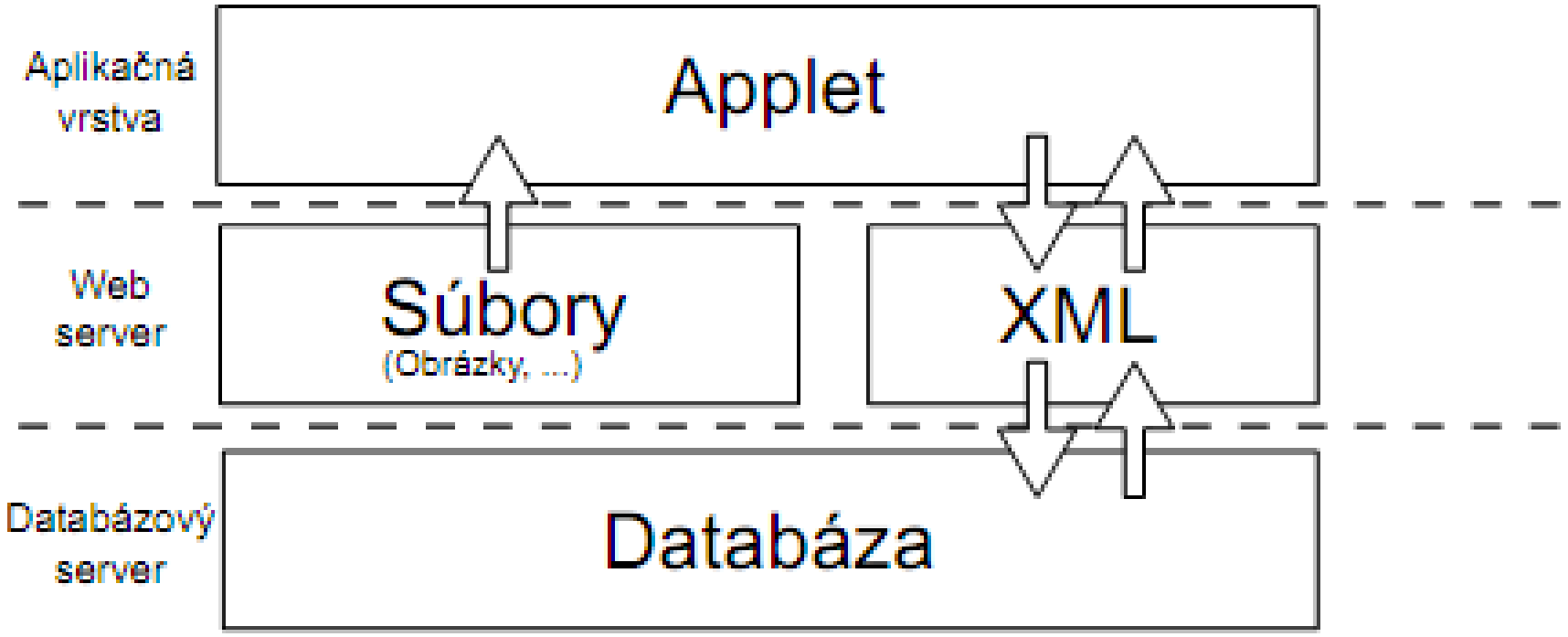
http://brhlovce.ra100.net

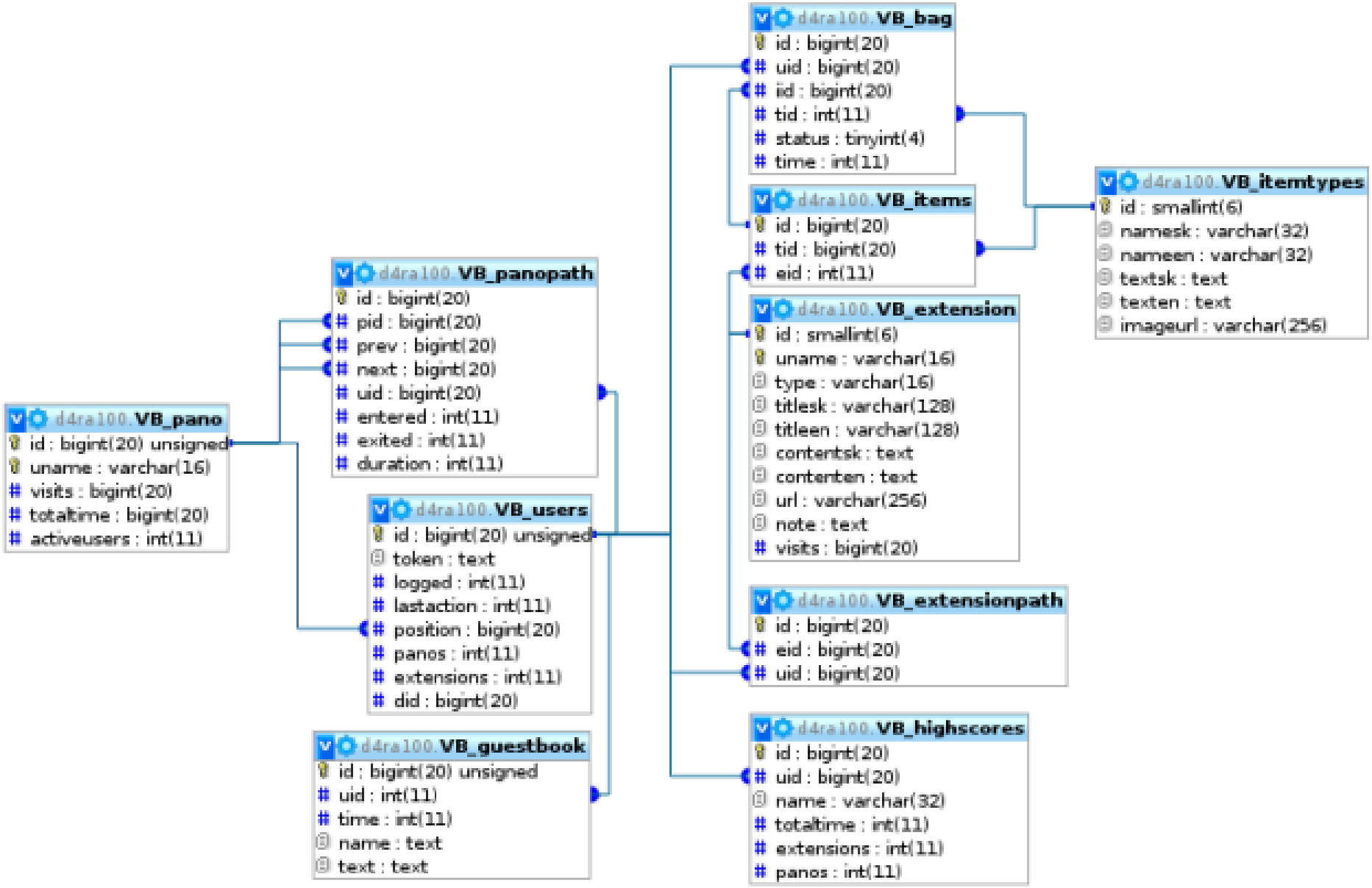
horný panel
rozšírenie
mapa

V-Brhlovce Context Diagram

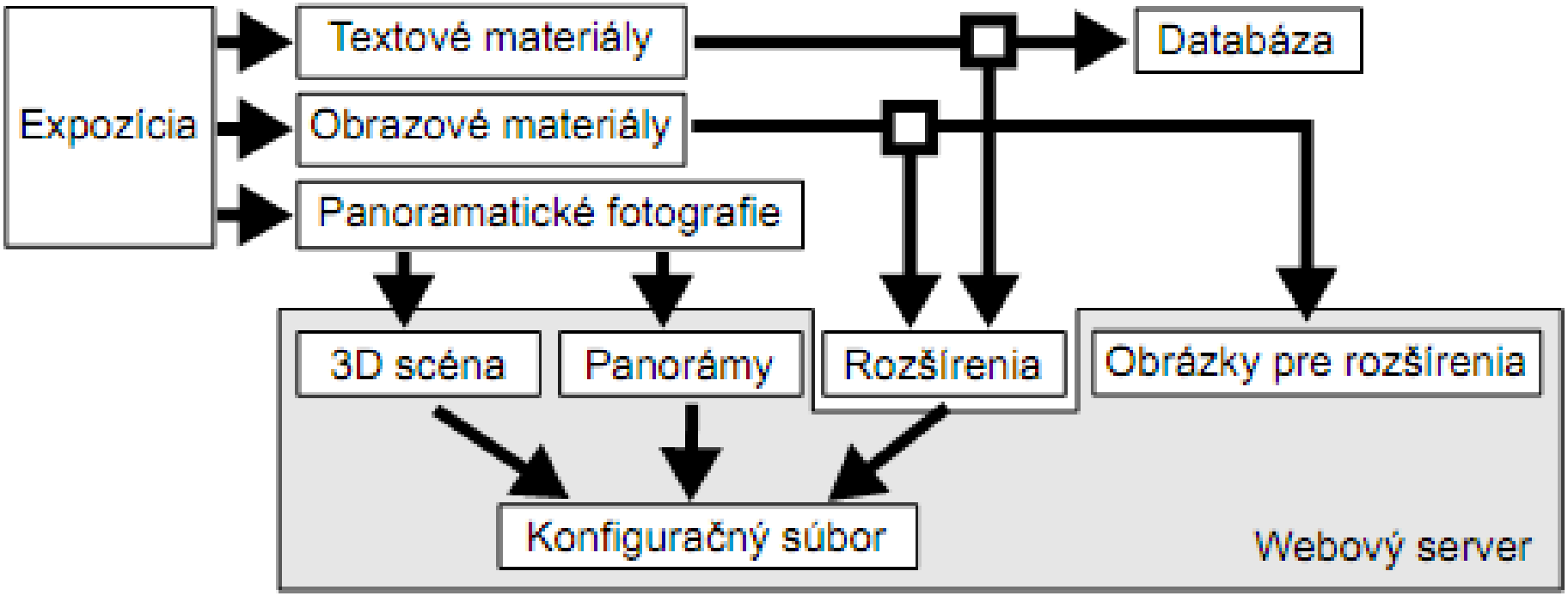


Architecture




d4ra100.VB_bag
id : bigint(20)
uid : bigint(20)
iid : bigint(20)
tid : int(11)
status : tinyint(4)
time : int(11)
d4ra100.VB_itemtypes
id : smallint(6)
namesk : varchar(32)
nameen : varchar(32)
textsk : text
texten : text
imageurl : varchar(256)
d4ra100.VB_items
id : bigint(20)
tid : bigint(20)
eid : int(11)
d4ra100.VB_panopath
id : bigint(20)
pid : bigint(20)
prev : bigint(20)
next : bigint(20)
uid : bigint(20)
entered : int(11)
exited : int(11)
duration : int(11)
d4ra100.VB_extension
id : smallint(6)
uname : varchar(16)
type : varchar(16)
titlesk : varchar(128)
titleen : varchar(128)
contentsk : text
contenten : text
url : varchar(256)
note : text
visits : bigint(20)
d4ra100.VB_pano
id : bigint(20) unsigned
uname : varchar(16)
visits : bigint(20)
totaltime : bigint(20)
activeusers : int(11)
d4ra100.VB_users
id : bigint(20) unsigned
token : text
logged : int(11)
lastaction : int(11)
position : bigint(20)
panos : int(11)
extensions : int(11)
did : bigint(20)
d4ra100.VB_extensionpath
id : bigint(20)
eid : bigint(20)
uid : bigint(20)
d4ra100.VB_guestbook
id : bigint(20) unsigned
uid : int(11)
time : int(11)
name : text
text : text
d4ra100.VB_highscores
id : bigint(20)
uid : bigint(20)
name : varchar(32)
totaltime : int(11)
extensions : int(11)
panos : int(11)

Primary/secondary data



Virtuálne Brhlovce

Skalné obydlia | Virtuálna prehliadka | O projekte | Kontakt

Skalné obydlia

Výnimočný príklad toho, ako človek dokázal využiť prírodné danosti vlastného životného prostredia, sú skalné obydlia v malej hontianskej dedinke Brhlovce v Levickom okrese. Tretohorný sopečný tuf tvoriaci geologické podložie aj tunajšieho chotára umožnil obyvateľom obce vysekať si do mäkkej skaly nielen hospodárske no tiež obytné priestory svojho domova. Brhlovce (prvá zmienka z r. 1245) zo svojej dlhej histórie odvodzujú ústnym podaním dobu túreckých vojen za čas vzniku takýchto nezvyklých obydlí. Ako prvý ich opísal až Matej Bel v r. 1742 vo svojich Notitiach. Na kameň stvrdnutý sopečný popol umožnil vysekať príbytky do južného svahu Šurdy a Dolinky. Tunajším kamenárom poslúžil ako materiál, z ktorého vykresali nespočetné množstvo kvádrov na stavbu domov či klenby vinných pivníc, zárubne okien, dverí, schody, stĺpy gánkov i vrát, vstupné bránky pre sedliacke usadlosti mnohých hontianskych a tekovských obcí. Náhrobky z brhlovského kameňa sa dodnes nachádzajú na katolíckych, protestantských i židovských hroboch ba cintorínoch v širokom okolí. Kamenárskemu umeniu sa Brhlovčania priučili o taliánskych majstrov, ktorí postavili tunajší neskorobarokový kaštieľ (z r. 1756) a katolícky kostolík vedľa neho.

V roku 1963 slovenská vláda svojím uznesením č. 272 vyhlásila skalné obydlia v brhlovskej Šurde a Dolinke za pamiatkovú rezerváciu ľudovej architektúry. Tekovské múzeum v Levicích tam v júni 1982 sprístupnilo verejnosti svoju vysunutú expozíciu ľudového bývania v usadlosti č. 142, kde ešte do roku 1988 žila rodina Ladislava Homoľu. Usadlosť má na konci dvora vysekané do skaly priestory až v 2 podlažiach (asi pol. 18-začiatok 20. storočia), po stranách dvora stoja z kameňa vymurované domy. Menší je z 80-r. 18. storočia, väčší je datovaný na priečeli r. 1902, zadnú izbu postavili až v 50. rokoch. Pôvodne tu žili až tri rodiny v spoločnom dvore. Obytné miestnosti domov (pitvor, kuchyňa, izby) aj letná kuchyňa v skale sú zariadené tak, aby hodnoverne priblížili atmosféru živej domácnosti a ukázali vývoj bytovej kultúry obyvateľov Brhlovec i širšieho regiónu Tekova a Hontu v priebehu 20. storočia. Vybavenie hospodárskych priestorov (komora, maštaľ, kamenárska dielňa) aspoň v náznaku priblížuje tradičný spôsob obživy Brhlovčanov.

Za záchranu, obnovu a ďalšie adekvátne využitie tejto výnimočnej pamiatky ľudového staviteľstva dostalo Tekovské múzeum v roku 1983 svoju trvalú expozíciu Skalné obydlia v Brhlovciach medzinárodné ocenenie bronzovú plakétu EUROPA NOSTRA.

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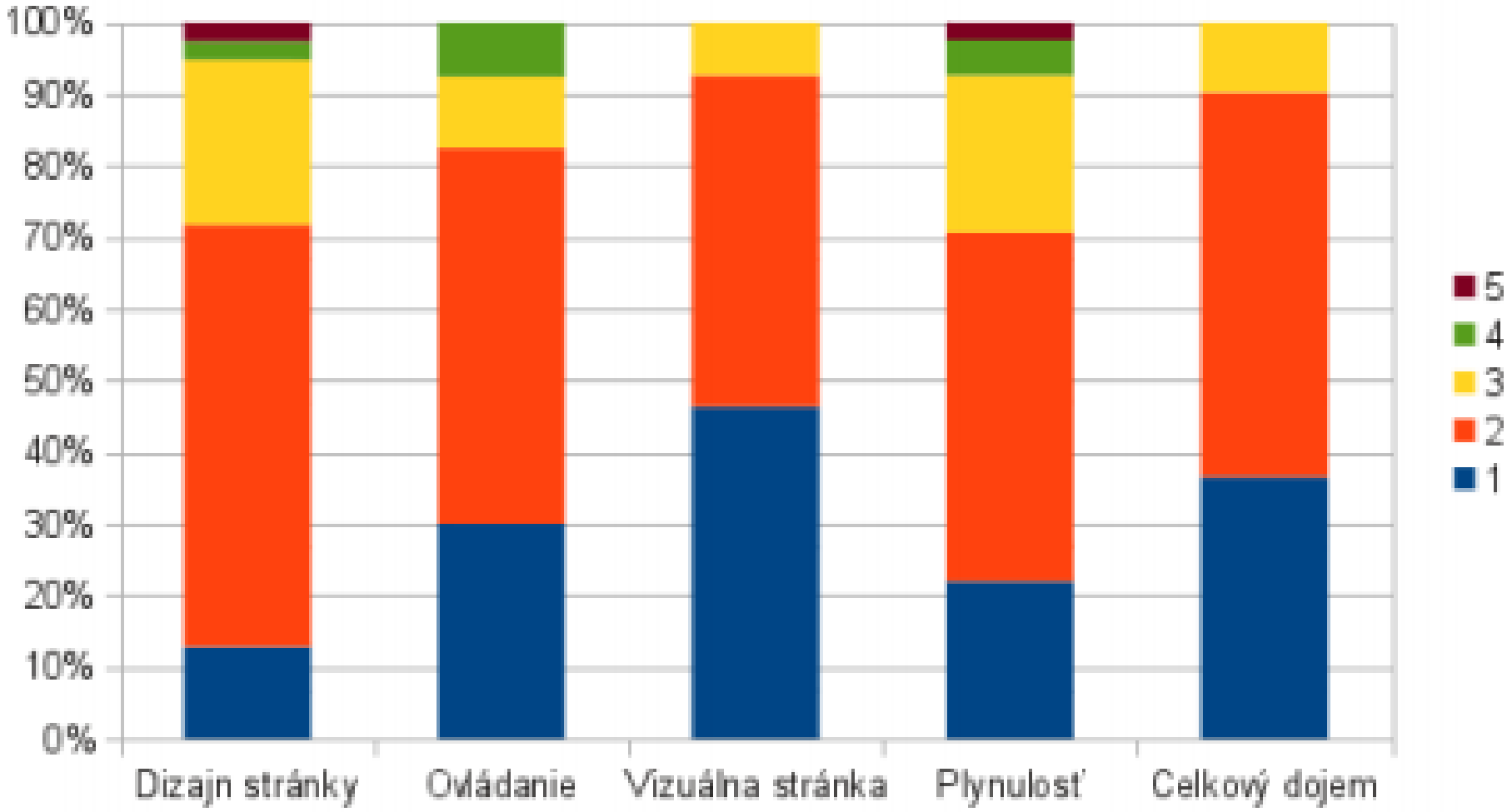
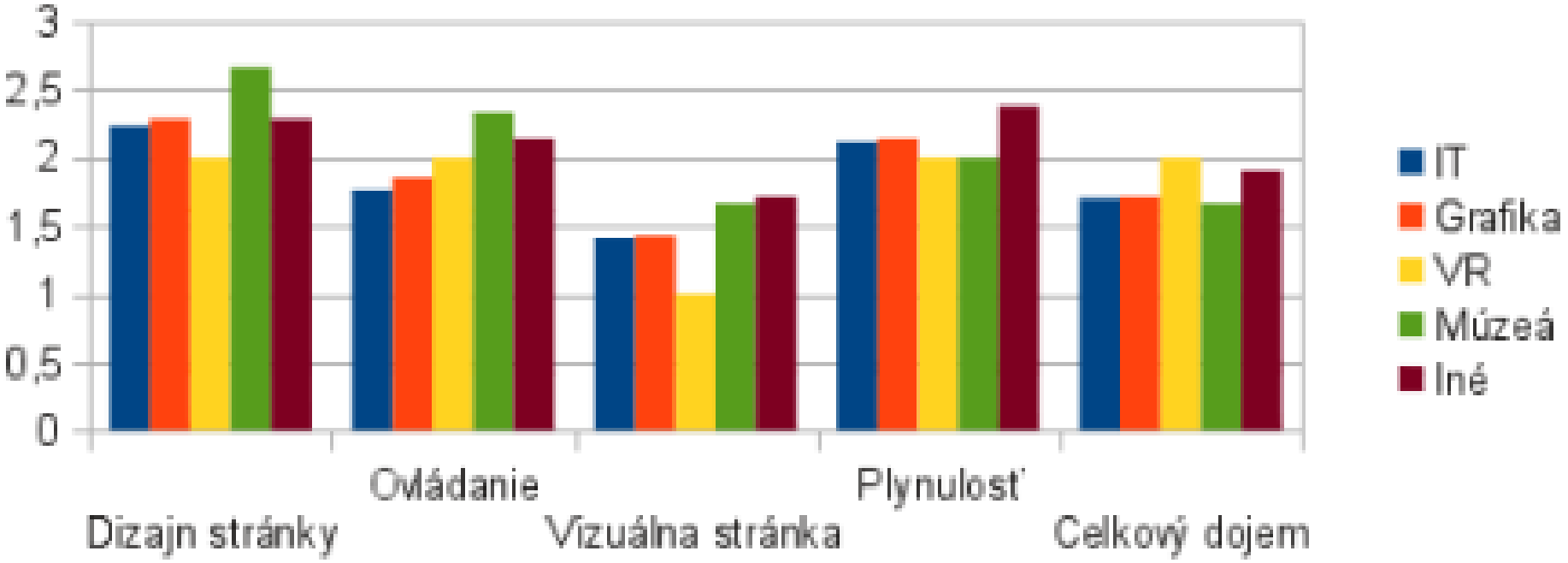
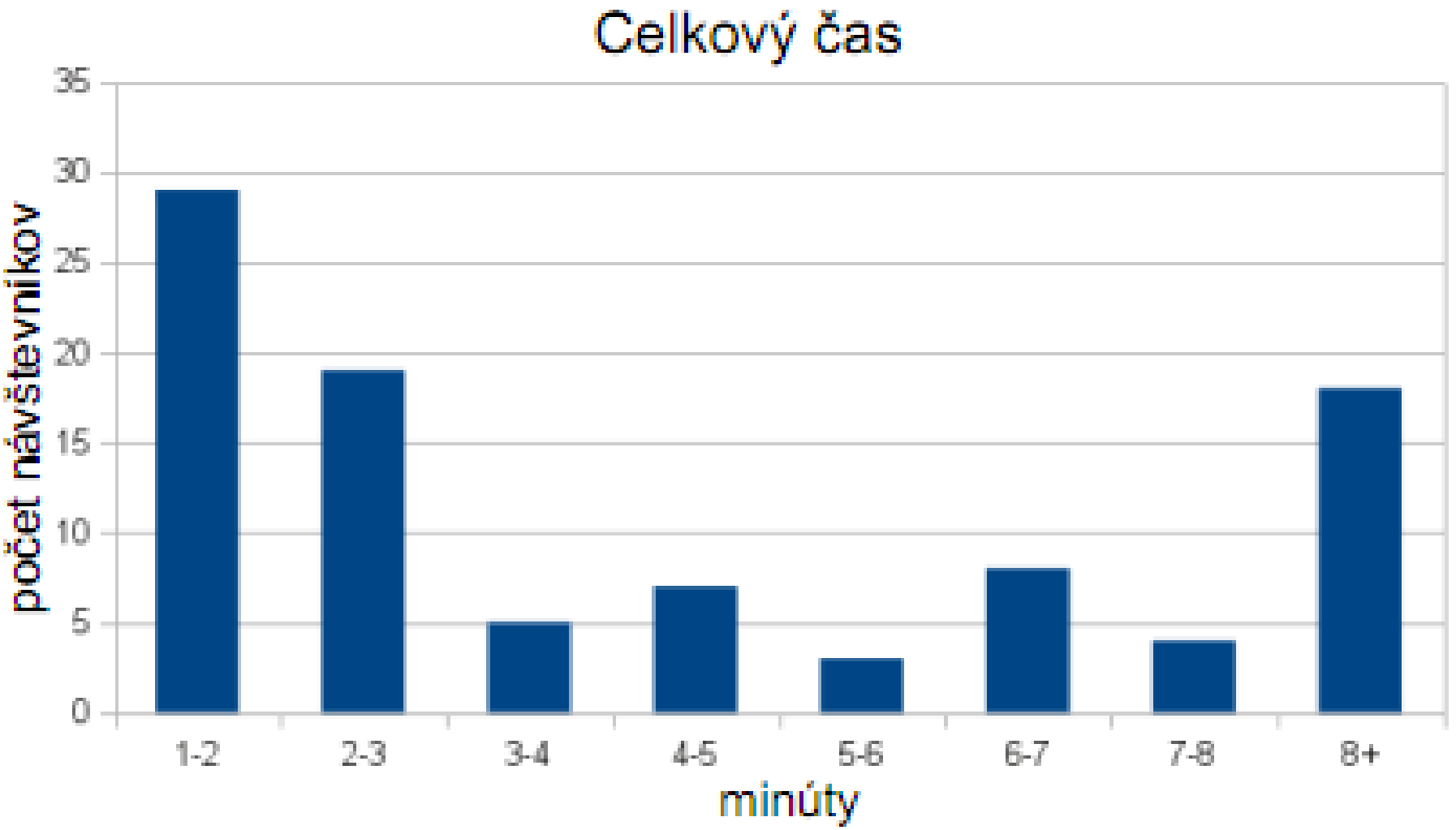
Quantitative Evaluation



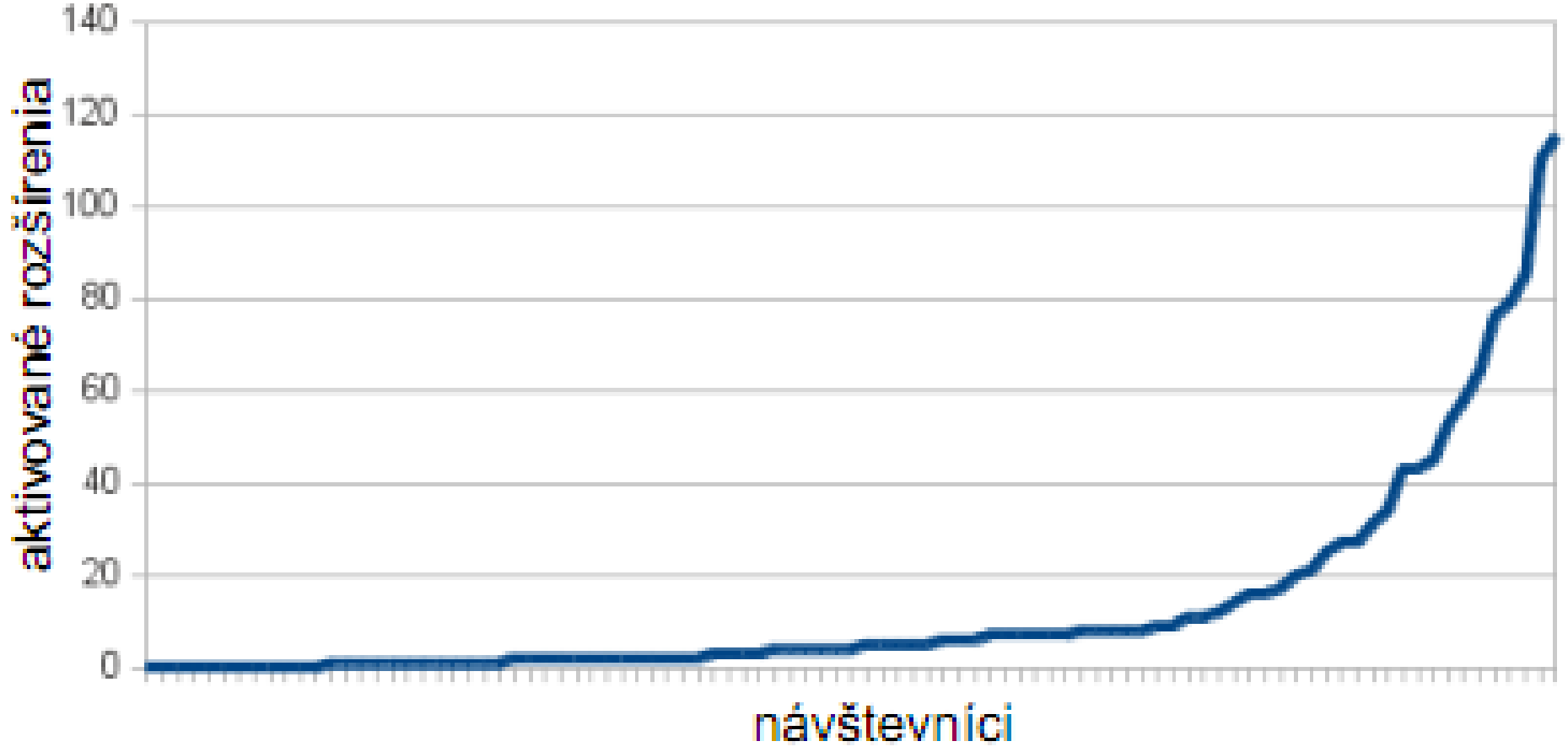
Feedback on Design/Use



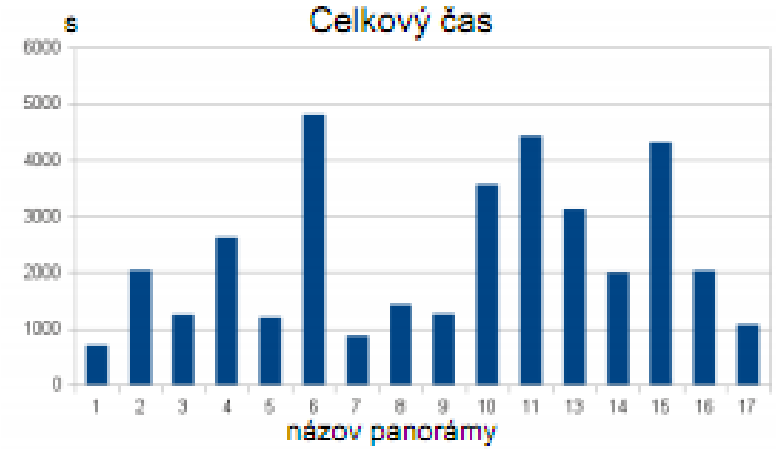
Visit Duration

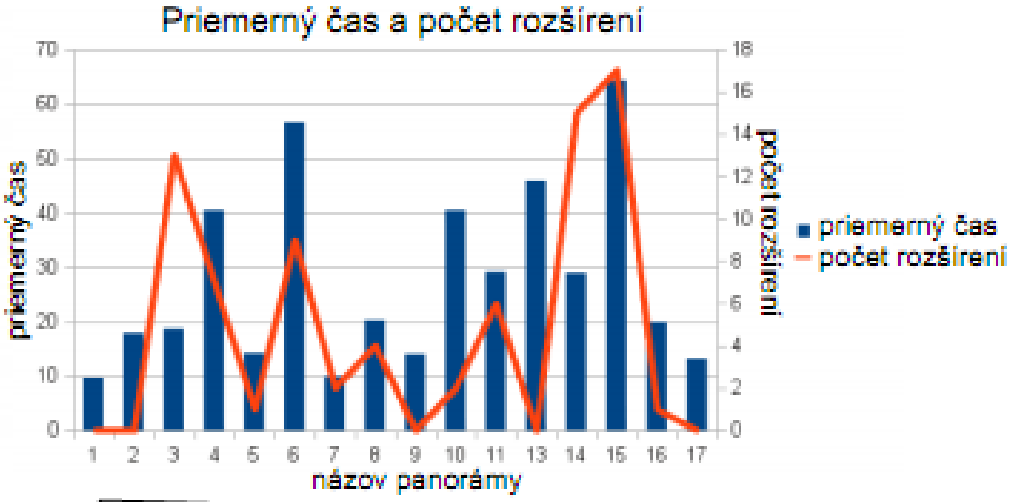


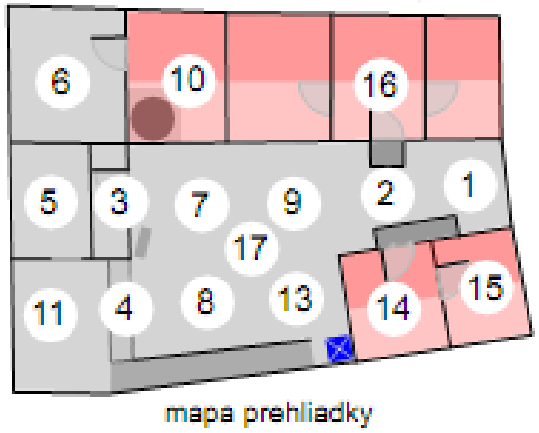
Extension Activations



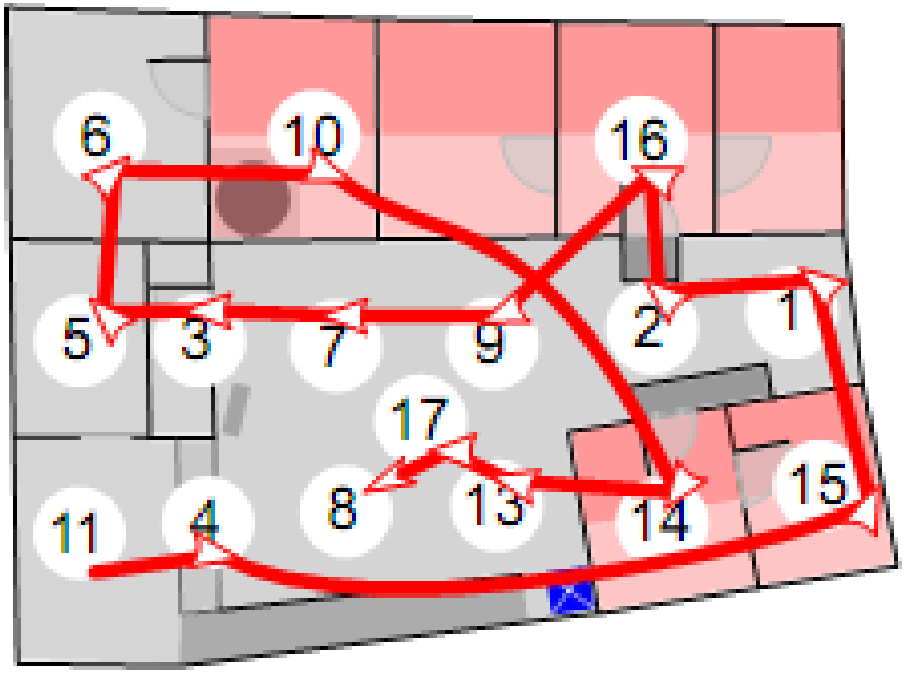
Visiting Panoramas



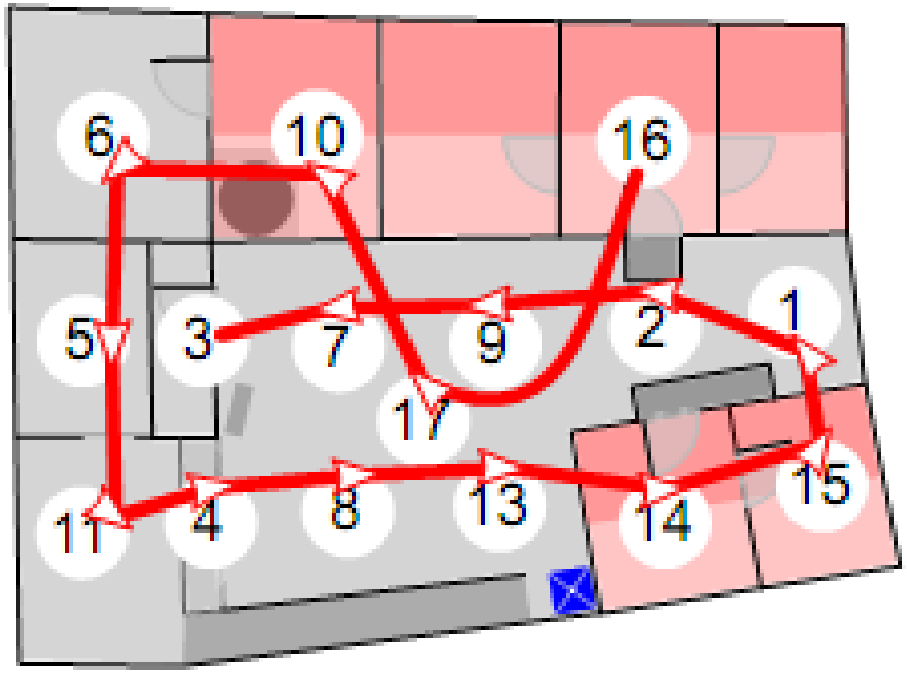




Preferred Story



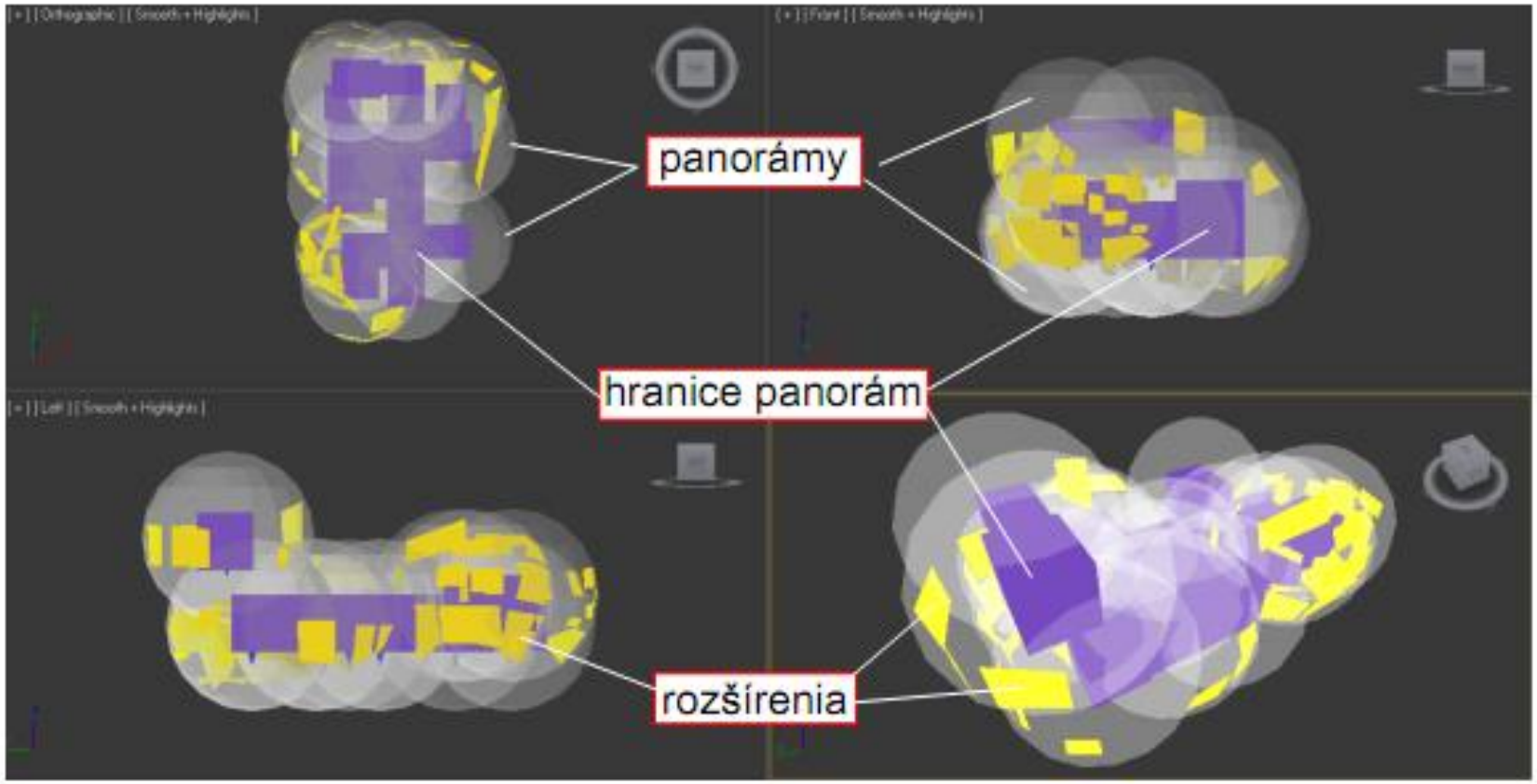
z východzieho bodu



ku koncovému bodu

Winning Activations

3D Model & Spheric PanoViews



ARTIFICIAL REALITY: Myron KRUEGER

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- **EUROSENSE Slovakia**
- **Prover, Centaur, Vis Gravis**

Conclusions

- **Virtual time is controlled by the author (materialist, idealist, or phenomenology)**
- **Our cultural capital static/dynamic**
- **Our goal – to maximize**
- **Old media – directing, new media have virtual time and real interestingness (metaprograms, the first measures based on behavior)**
- **The only true property we have is the time of our lives**

Conclusions? 4? Didactics?

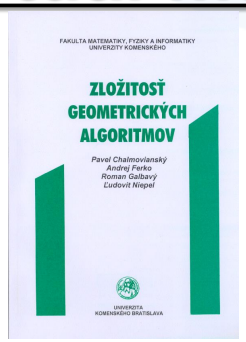
- No metaphor, no analogy, no rhetorics
- Rhetorics 1415 rediscovered 4 music
- Rhetorics 2007 rediscovered 4 virtual museum
- Teaching algorithms by metaphors (no EMM)
- Teaching strategies earlier (GAMCA, GJH)

Theorizing Digital Cultural Heritage

A Critical Discourse

edited by Fiona Cameron and Sarah Kenderdine

Each class is a virtual museum



Thank You

- **For Your Attention**

... and Time

- ... and Time

17. KONFERENCIA KOŠICKÝCH MATEMATIKOV, Herľany, 6. – 9. apríl 2016

QUESTIONABLE QUESTIONS

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