Visualisation, Rendering and Animation

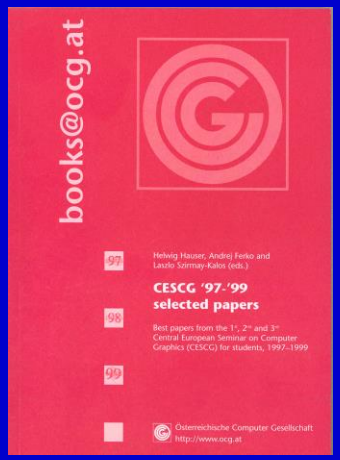
2 VO / 1 KU (2001-2004)

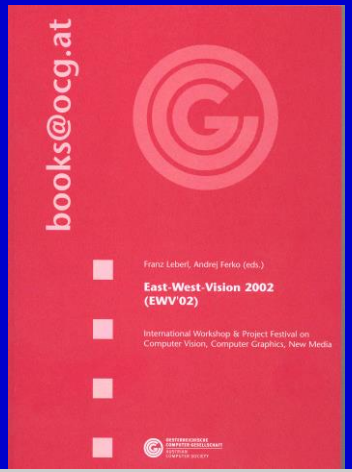
Heinz Mayer, Franz Leberl & Andrej Ferko

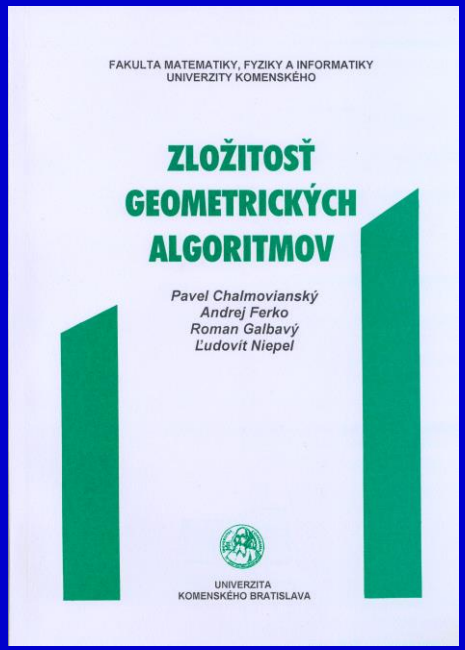
ferko@icg.tu-graz.ac.at

Short podcast version 2020

Non-fiction Books, SCCG & CESCG

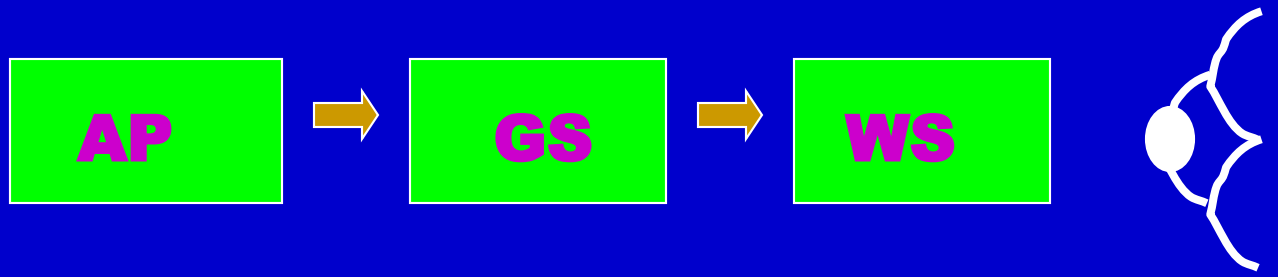






On Model of a Human Being

- *Problem – Application Program - Solution*



GUI HVS

Graphics & Visual Computing

ACM Computing Curriculum

at http://www.computer.org/education/cc2001/final/gv.htm:

The area encompassed by Graphics and Visual Computing (GV) is divided into four interrelated fields:

Computer graphics.
Visualization.
Virtual reality.
Computer vision.

Computer Graphics

***Computer graphics** is the art and science of communicating information using images that are generated and presented through computation. This requires:*

***(a)** the design and construction of models that represent information in ways that support the creation and viewing of images,*

***(b)** the design of devices and techniques through which the person may interact with the model or the view,*

***(c)** the creation of techniques for rendering the model, and*

***(d)** the design of ways the images may be preserved. The goal of computer graphics is to engage the person's visual centers alongside other cognitive centers in understanding.*

Visualization

Visualization. *The field of visualization seeks to determine and present underlying correlated structures and relationships in both scientific (computational and medical sciences) and more abstract datasets.*

The prime objective of the presentation should be to communicate the information in a dataset so as to enhance understanding.

Although current techniques of visualization exploit visual abilities of humans, other sensory modalities, including sound and haptics (touch), are also being considered to aid the discovery process of information.

SIGGRAPH movie

Virtual reality

Virtual reality. *Virtual reality (VR) enables users to experience a three-dimensional environment generated using computer graphics, and perhaps other sensory modalities, to provide an environment for enhanced interaction between a human user and a computer-created world.*

Computer vision

Computer vision. *The goal of computer vision (CV) is to deduce the properties and structure of the three-dimensional world from one or more two-dimensional images. The understanding and practice of computer vision depends upon core concepts in computing, but also relates strongly to the disciplines of physics, mathematics, and psychology.*

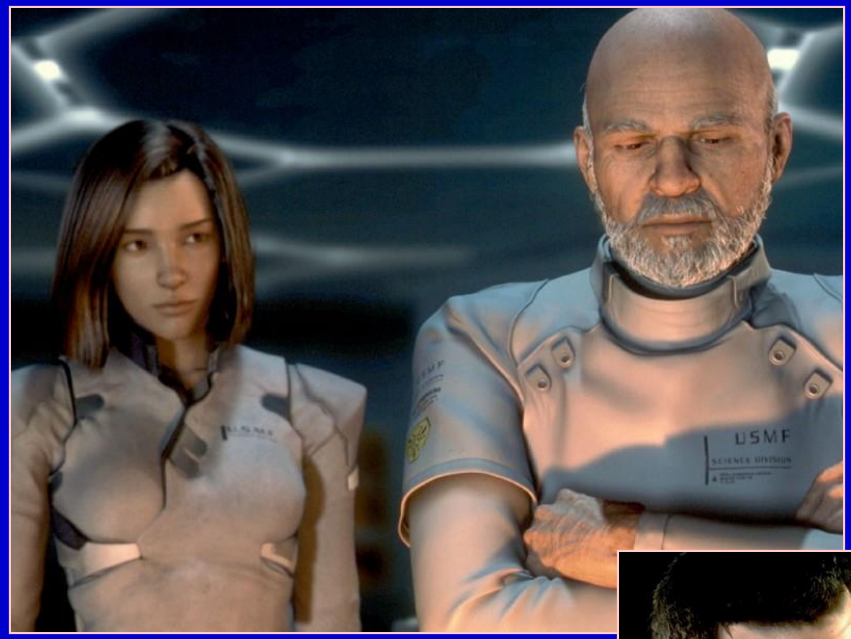
Compare Reality - Synthesis

Photograph

Rendering using the deterministic method

- *2001* - ***Final Fantasy*** *(The Spirits Within)*
  - *all characters animated, photorealism, hair for millions dollars*

U.S.M.F


USMF
SCIENCE DIVISION

FINAL FANTASY

FINAL FANTASY

FINAL FANTASY

FINAL FANTASY

FINAL FANTASY

FINAL FANTASY

The Graphics Pipeline Steps

input devices

modeler

Modeling

transformations

projection

clipping

visibility

Rendering

shading

rasterization

Output

device drivers

output devices

The Three Brains/Heads

input devices

modeler

Modeling

transformations

projection

clipping

visibility

shading

Rendering

rasterization

Output

device drivers

output devices

Triple Schizofreny

Application Programmer

input devices

modeler

Modeling

transformations

GS author

projection

clipping

visibility

Rendering

shading

rasterization

Output

device drivers

outp

User, bonnie,
ISO: operator,
customer, boss...

Computer Science Context

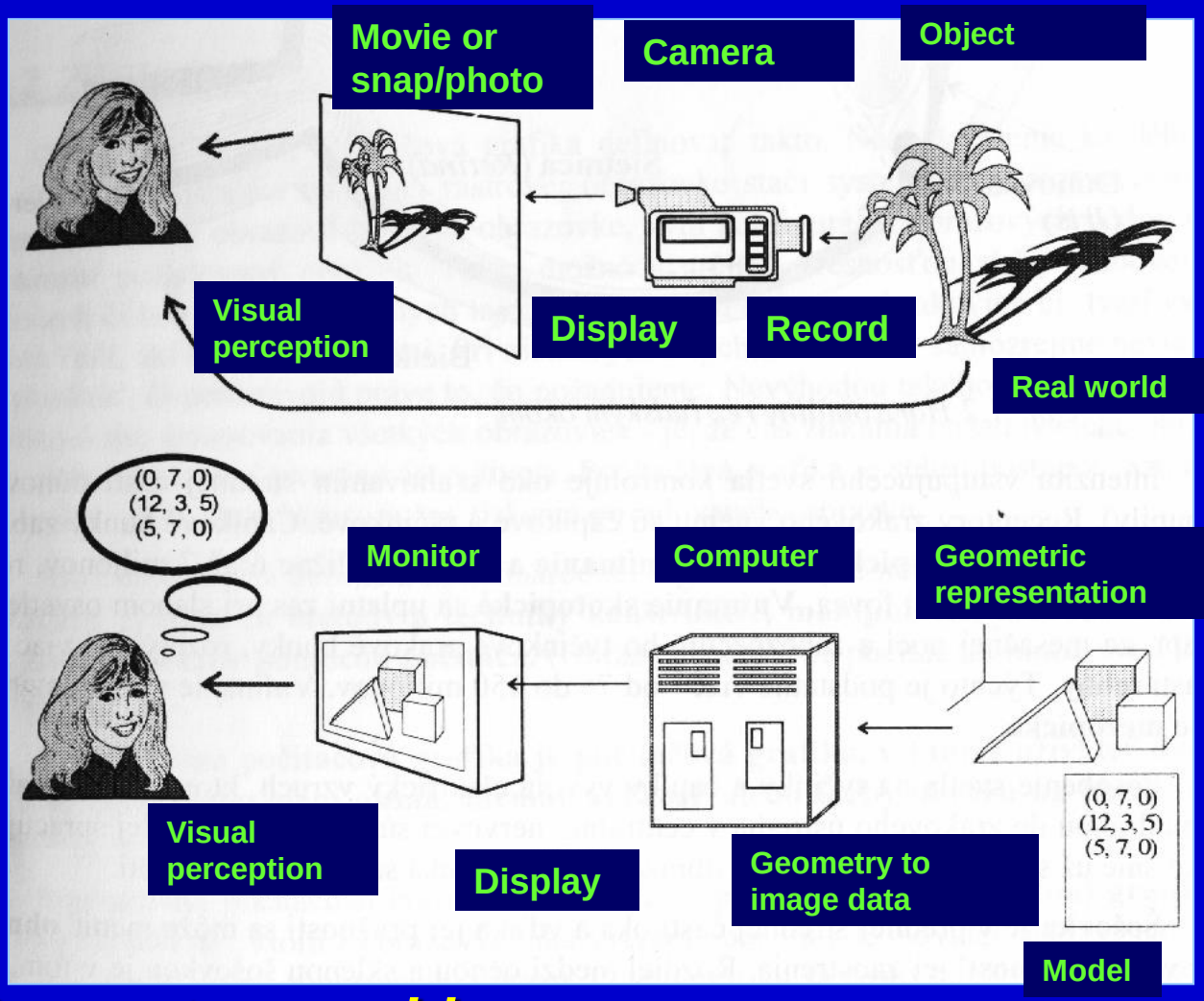
Reference Models:

- Simple
- ISO (GKS, PHIGS, PREMO, ...)
- Others… (OpenGL, DirectX…)

Analogies:

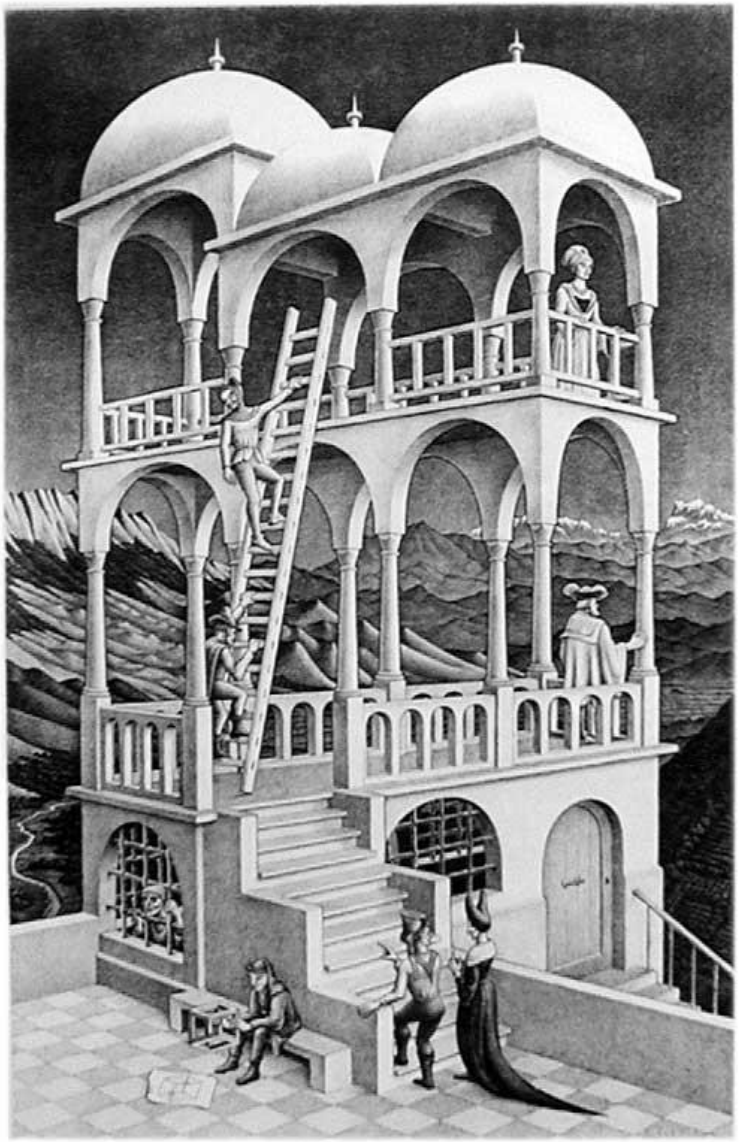
- Photography

Analogy: photography & computer graphics

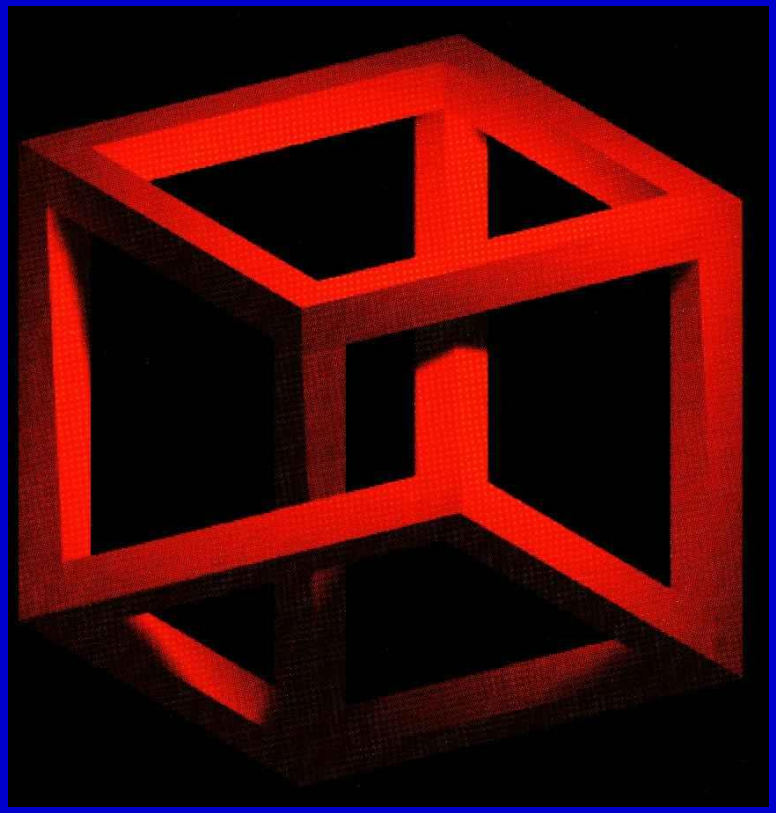


- **ISO: Computer graphics:** *methods & techniques for construction, manipulation, storage and displaying pictures using computer.*

ESCHER

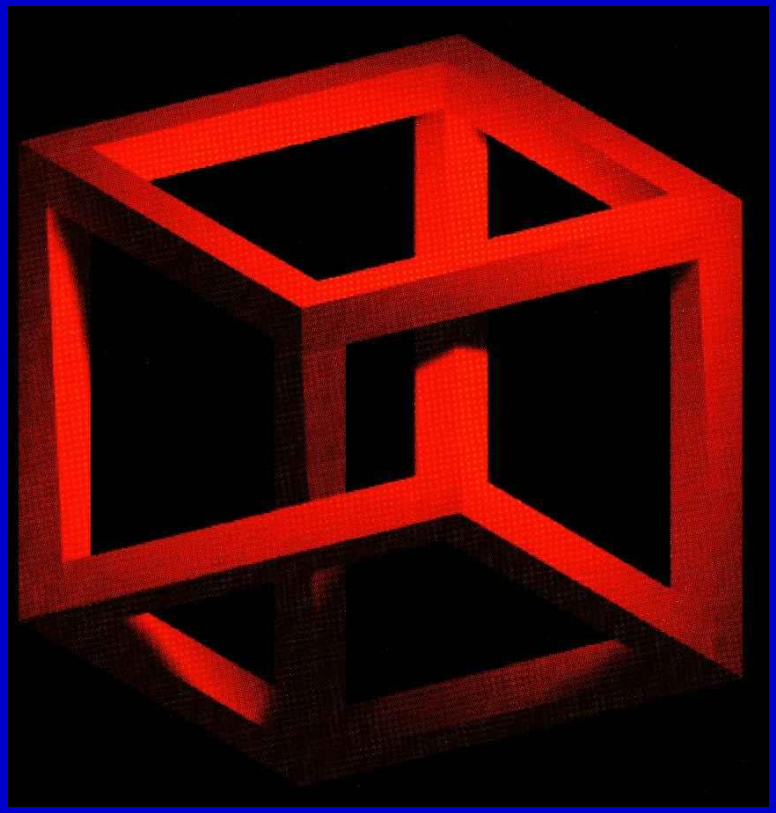


KUBOID by P. Eliáš



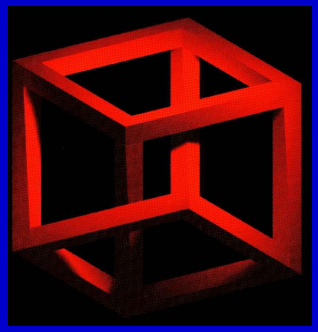
∃?

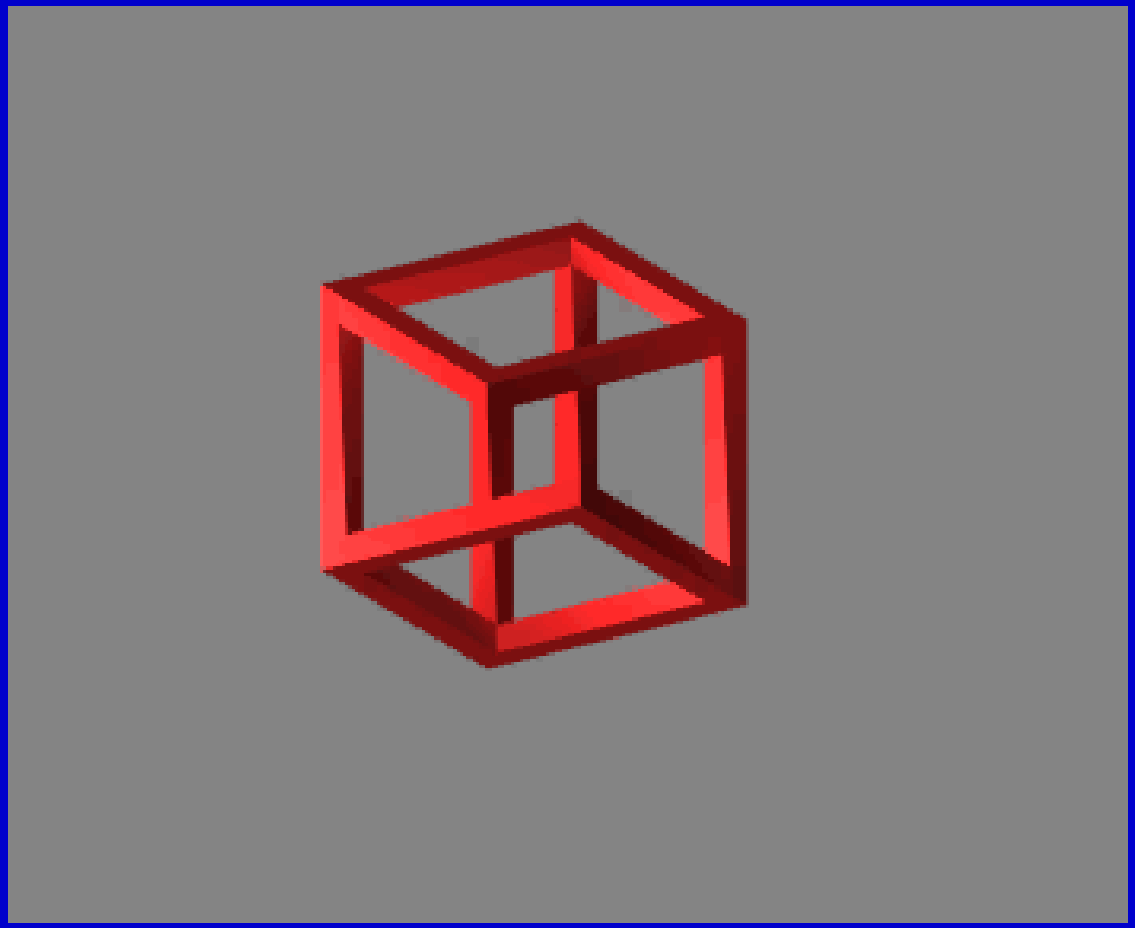
KUBOID by P. Eliáš



∃!

KUBOID by P. Eliáš



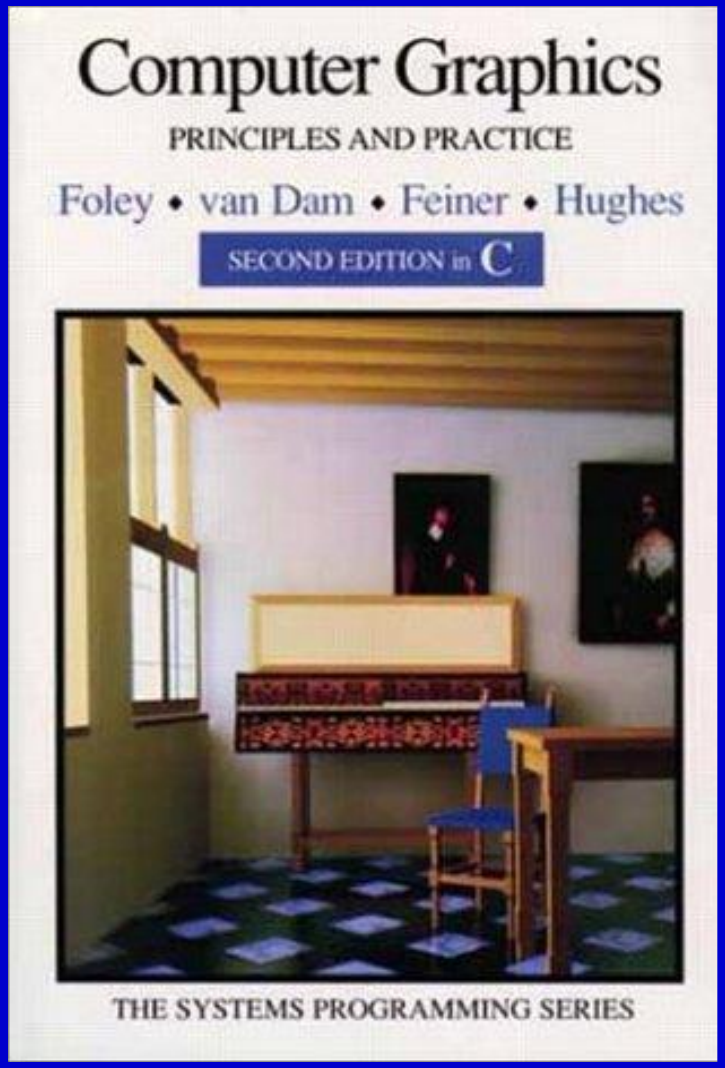


www.dunako.com

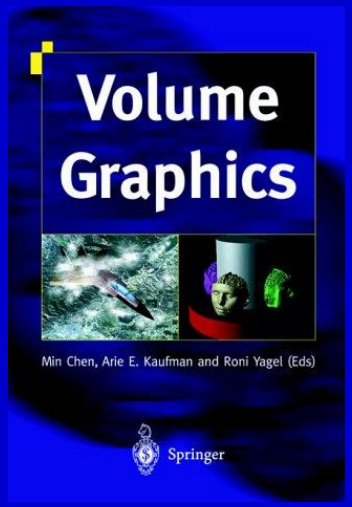
Computer Graphics Motivation

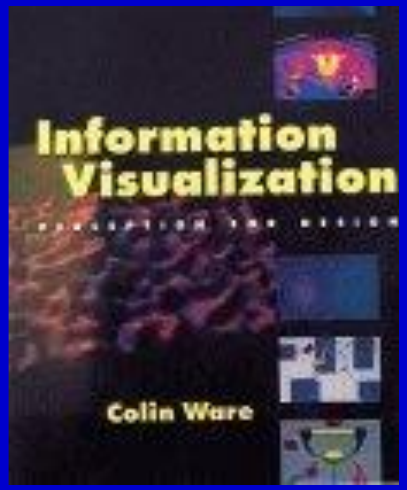
- *no Marxistic mass of workers, but the technology*
- *three great discoveries*
  - *microprocessor*
  - *open system*
  - *global network*
- *problems*
  - *lack of investments and standards*
  - *byrocratic stupidity*
  - *low speed bandwith*
  - *enormous data extent...*
- *technology borders, knowledge and/or fantasy*

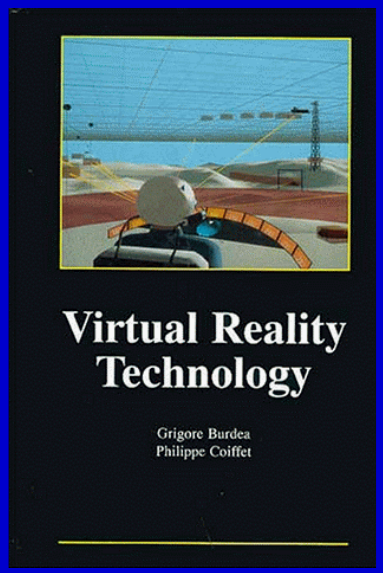
Computer Graphics Bible

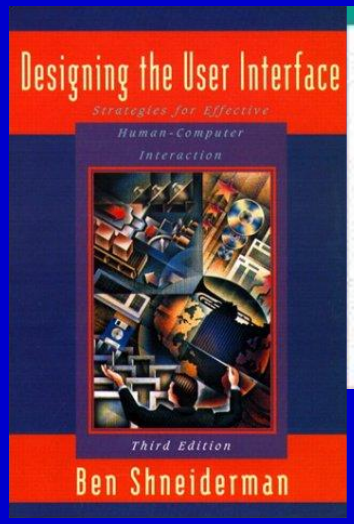


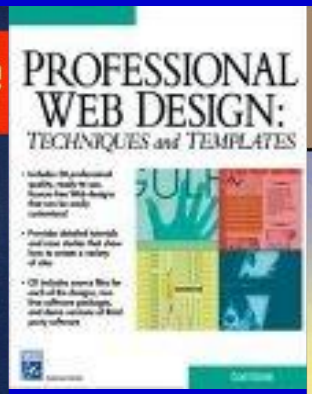
Graphics Sub-comunities

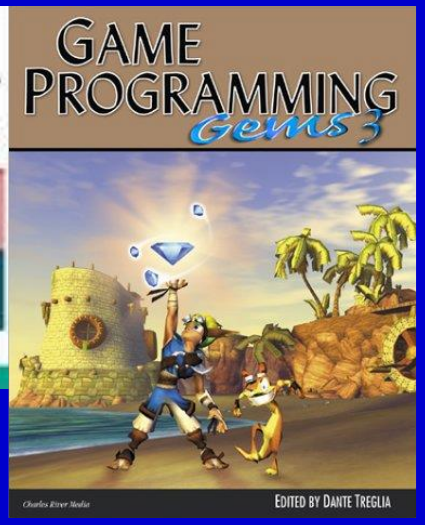


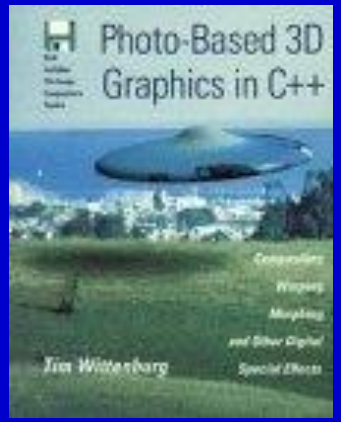


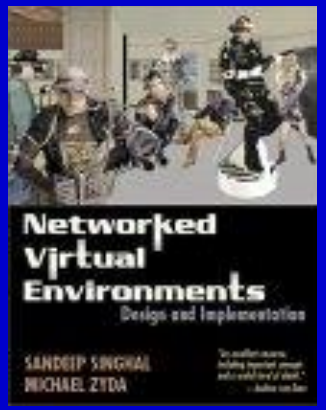




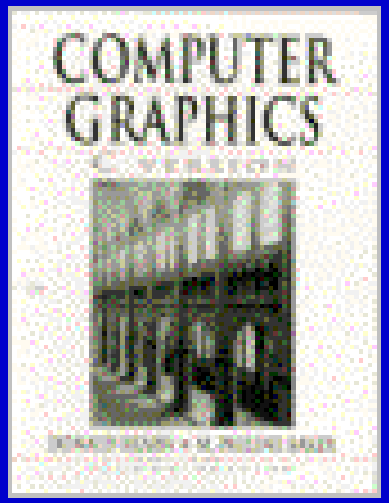


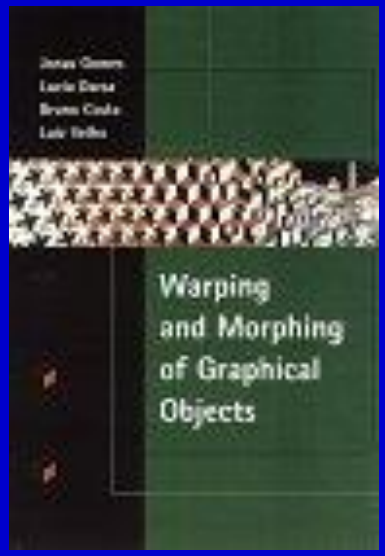


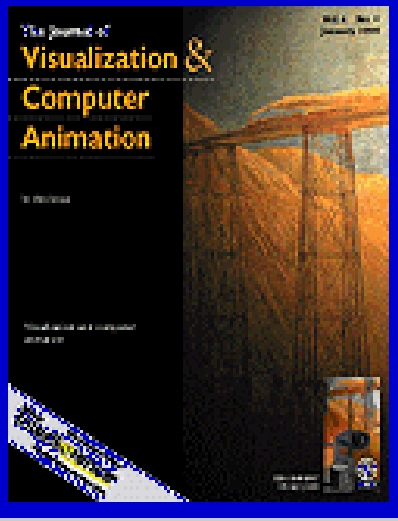




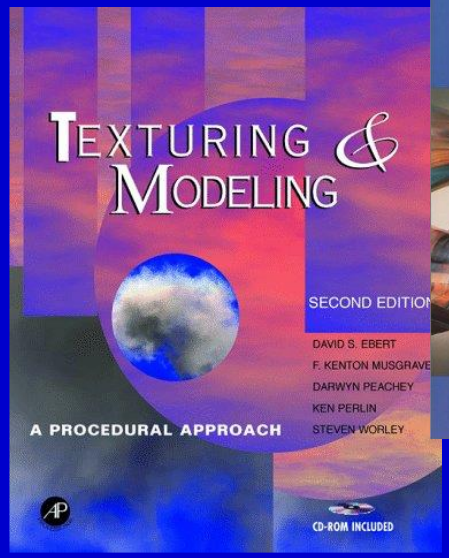
Graphics Sub-comunities

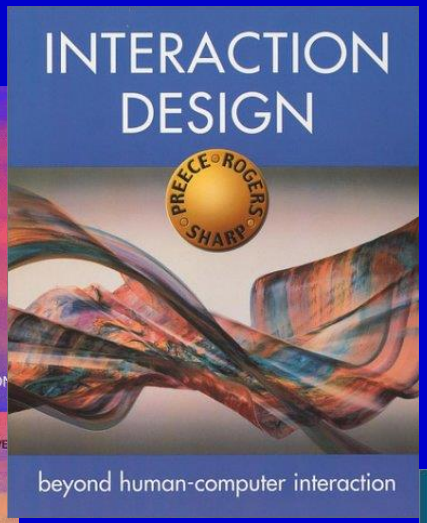


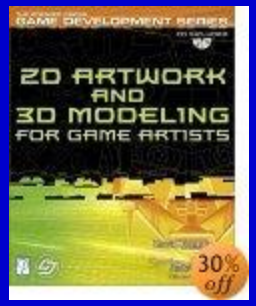


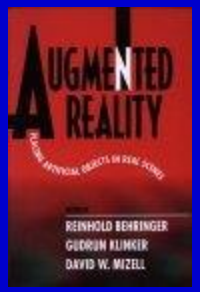


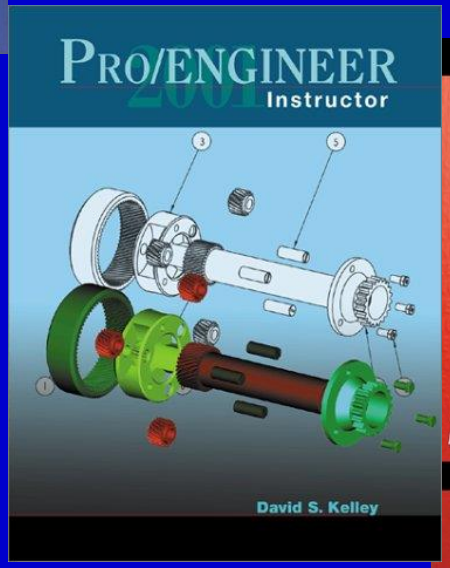
Graphics Sub-comunities

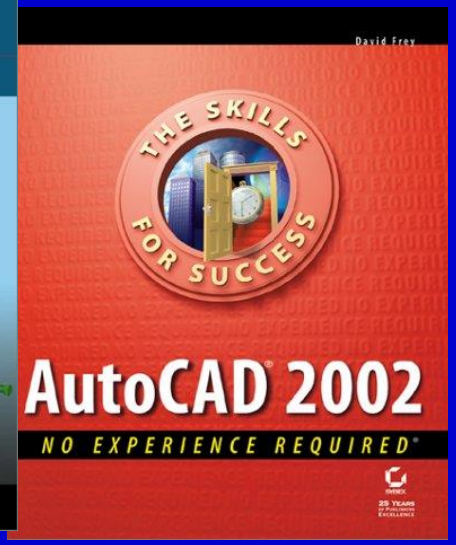












Thank You...

… for Your attention.

Visualisation, Rendering and Animation

2 VO / 1 KU (2001-2004)

Heinz Mayer, Franz Leberl & Andrej Ferko

ferko@icg.tu-graz.ac.at

Short podcast version 2020