186.828 Wissenschaftliches Arbeiten
186.046 Seminar aus Visualisierung
WS 2012

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Institute of Computer Graphics and Algorithms

Vienna University of Technology

Seminar

- Get an idea how scientific work is carried out (in CG)
  - Practice to review literature and get familiar with a particular scientific topic
    - Selecting, reading and understanding
    - Summarizing and explaining (orally and written)
    - Comparing and discussing
  - Practice to give a talk
  - Experience critical scientific discussion

Seminar

- Choose topic and wait until it is confirmed
  - mindek@cg.tuwien.ac.at
- Submit initial literature – official subscription
- Attend 3 Lectures:
  - „Wie halte ich einen Vortrag“ (Prof. Purgathofer)
  - „Forschung und wie sie funktioniert“ (Prof. Gröller)
  - „How to write a scientific paper“ (Prof. Wimmer)
- Write report of selected topic
- Give a presentation
- Active discussion participation

Talk

- Use institute's PowerPoint template for presentations (find it on webpage)
- 20 + 5 minutes talk
- Preferable in English
- Active discussion participation is mandatory and will be graded

Report

- State-of-the-Art report
- 8-12 pages per student
- In English
- Format reports in the style of a scientific paper
  - Use LaTeX (template is on the webpage)
- Students can work in groups of two
- The final version will be reviewed and graded by the supervisor

Important Dates

- **Mon, 22.10.**, Deadline list of literature
- Attend 3 lectures :
  - **Thu 8.11., 17:00,** “Forschung und wie sie funktioniert”
  - **Tue 13.11., 15:00,** “Wie halte ich einen Vortrag”
  - **Tue 20.11., 15:00**, “Wie schreibt man eine wissenschaftliche Arbeit”
- **Thu, 6.12.**, Deadline final version of your report
- **Thu, 20.12., 9:00 - 17:00**: Presentations

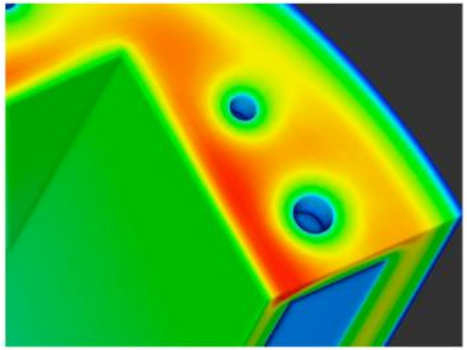
Grading

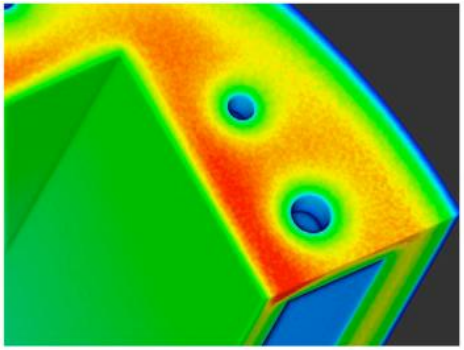
- It is necessary to attend the 3 lectures to get a positive grade!
- Grading criteria:
  - 50% written report
  - 40% presentation
  - 5% attendance during the presentations
  - 5% active discussion after the presentations

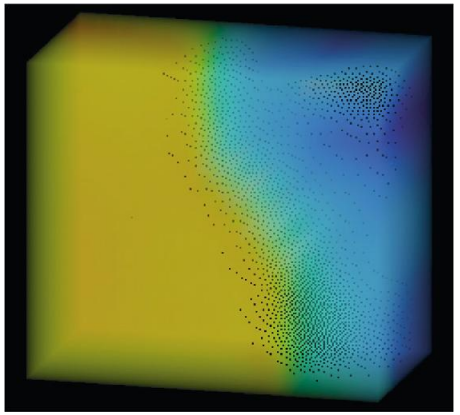
Topics 2012

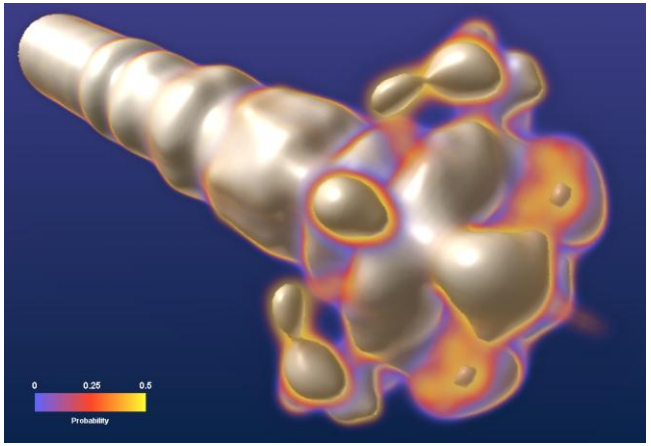
Uncertainty Visualization

- Positional uncertainty
- Data uncertainty (errors)
- Uncertainty representations
  - Volume rendering
  - Noise
  - Animations
  - Points with offset
  - …



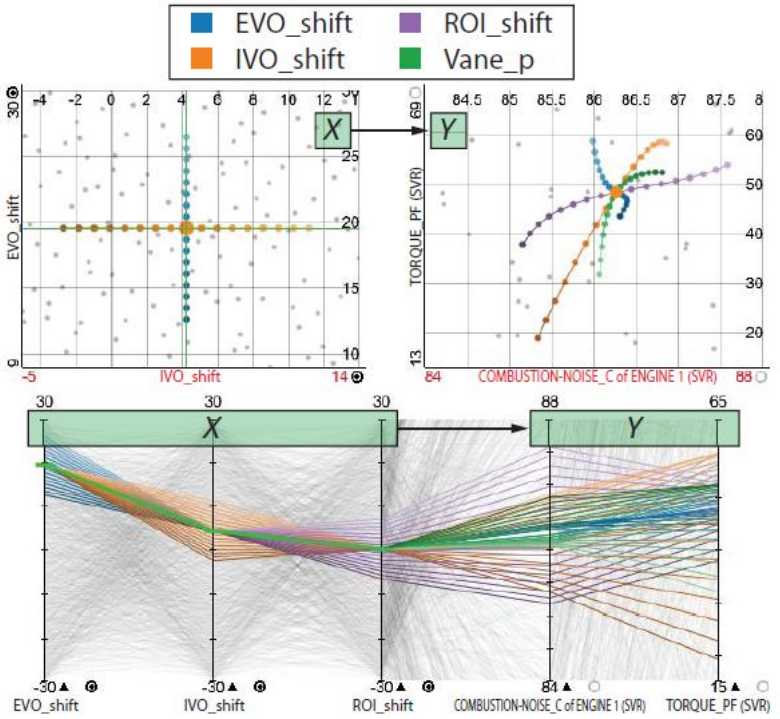


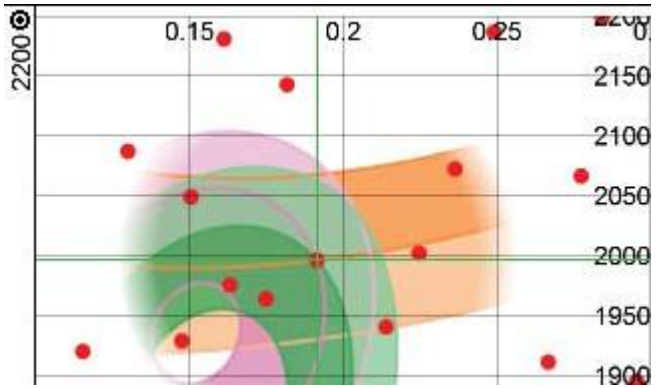




Parameter Visualization

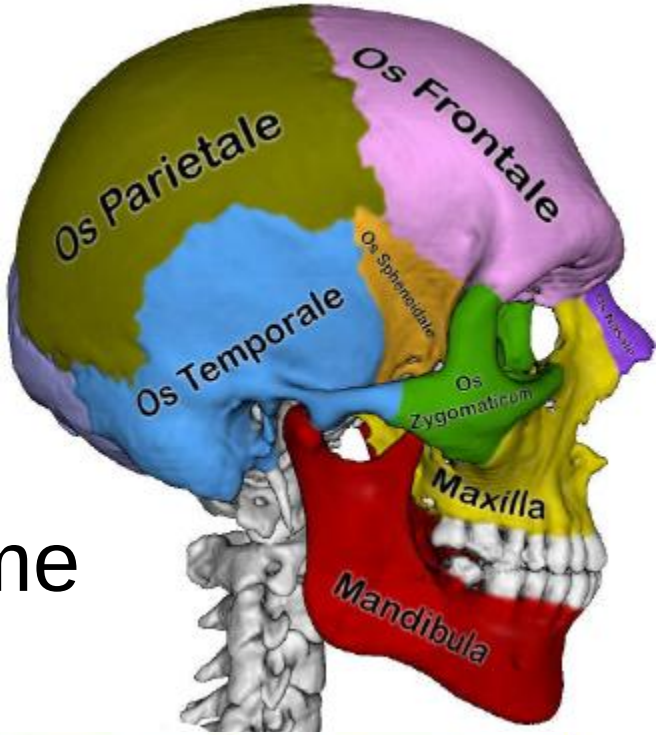
- Parameter exploration
- Stability analysis (with respect to parameters)
- Multi-dimensional data
  - Hyper slice
  - Parallel coordinates
  - Projecting parameter space
  - …

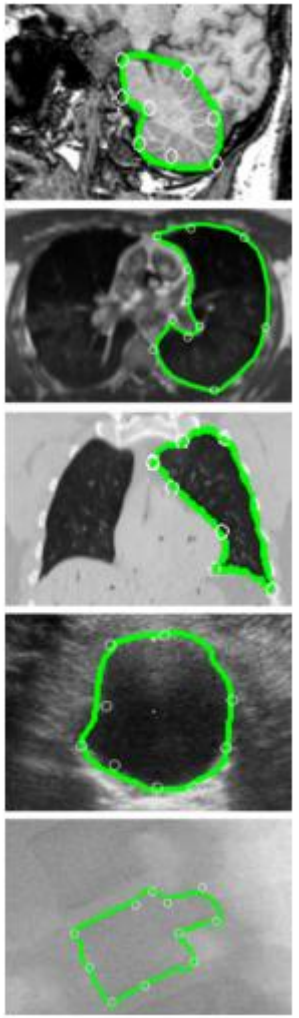


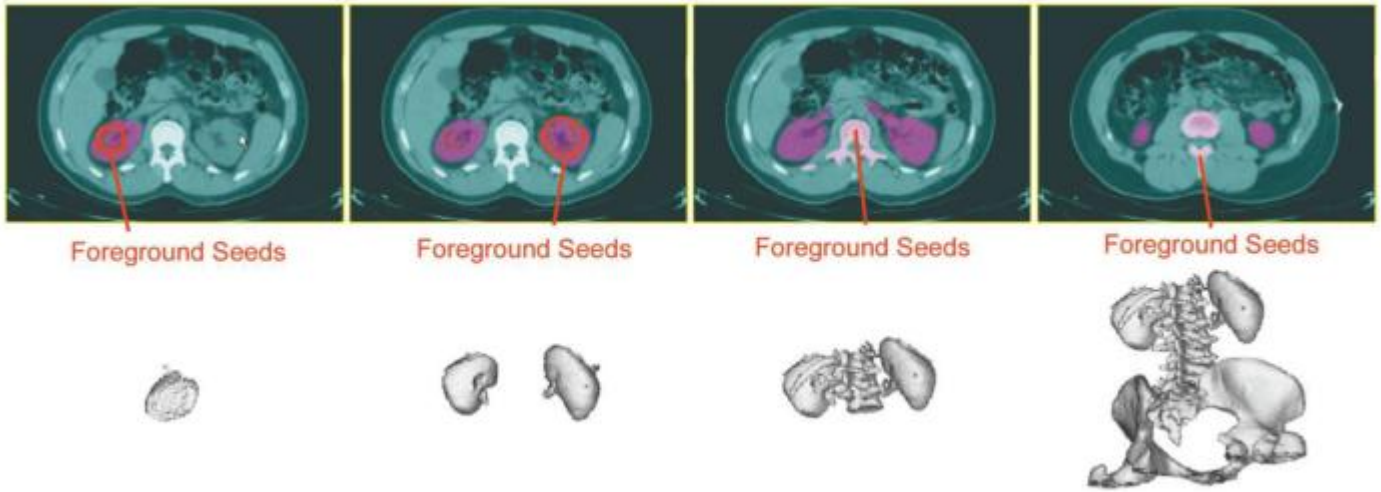


Volume Editing

- Smart Scissors
- Live Wire
- Live Surface
- Reeb Graphs
- Annotation of Volume

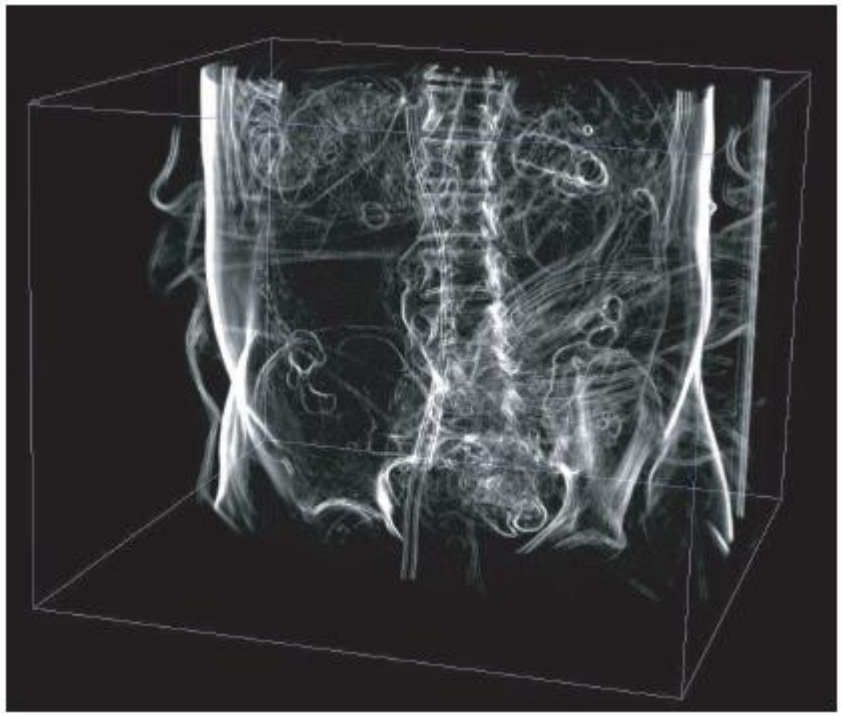


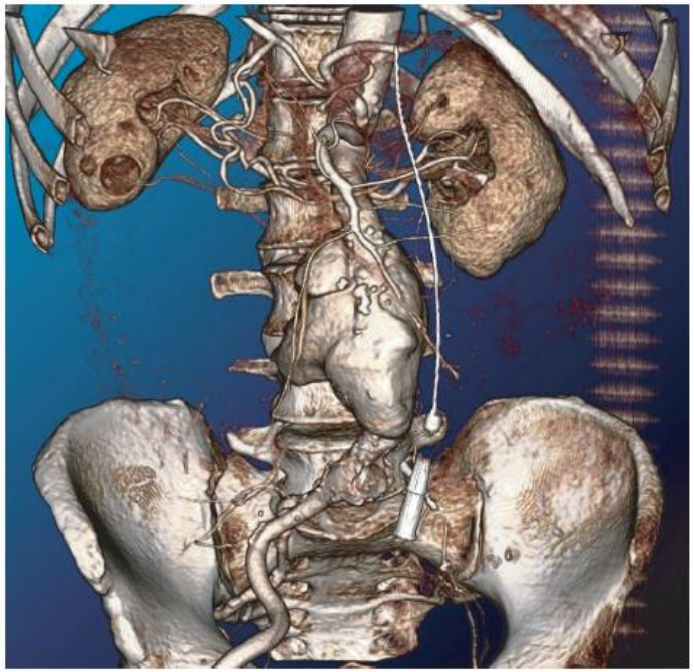




Pre-integration in Volume Rendering

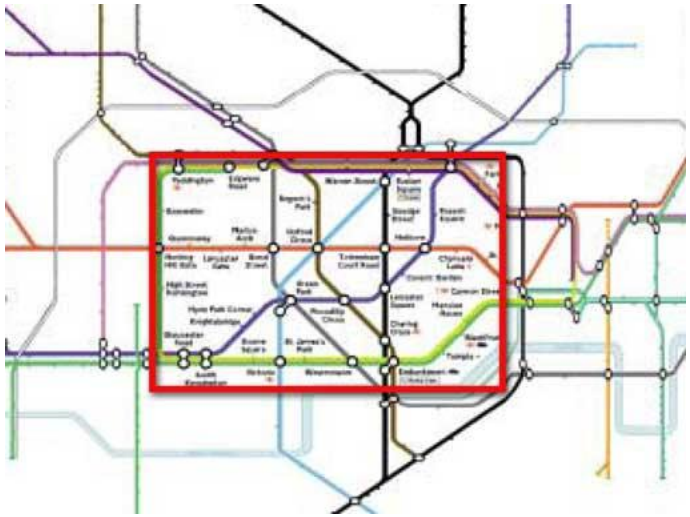
- Pre-integration of intensity
- Shading pre-integration
- Gradient interpolation
- Silhouette pre-integration

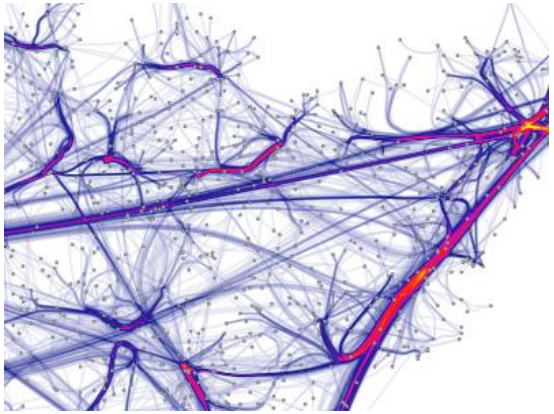




Focus+Context Techniques

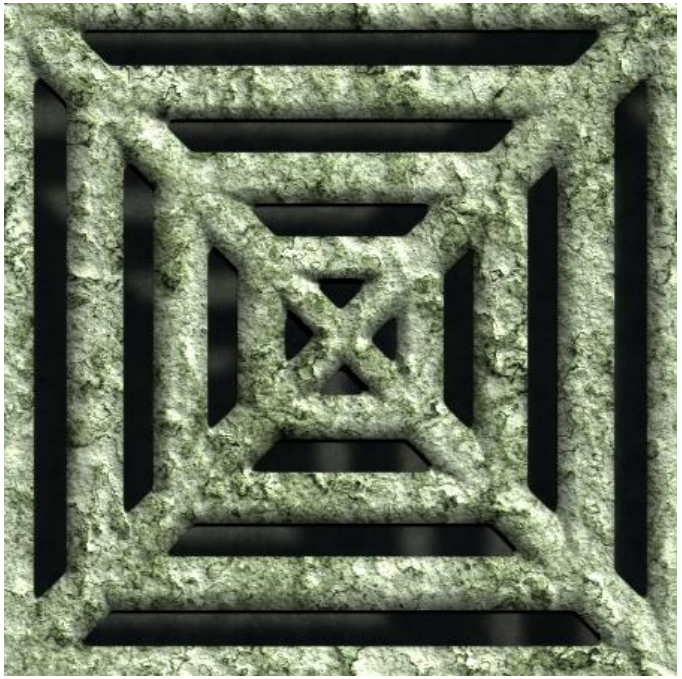
- Various tree and graph drawing algorithms
- Fisheye, LOD





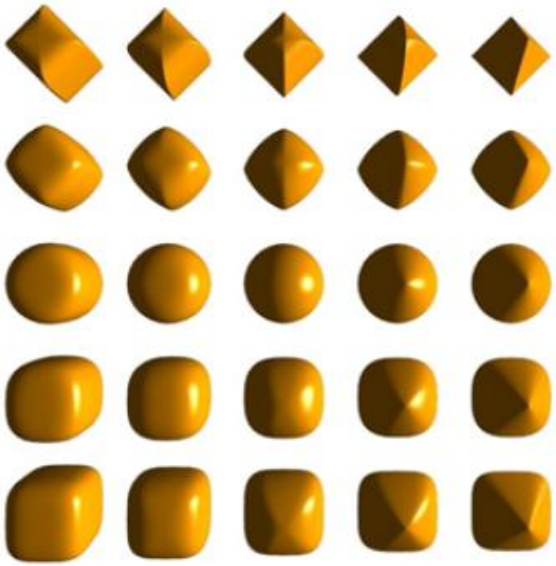
Procedural Content Generation

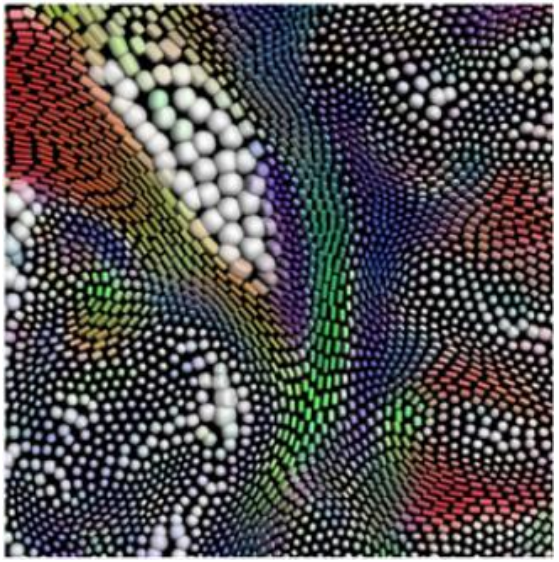
- 3D models
- Landscapes
- Textures



Glyph-based Visualization

- Types of glyphs
  - Arrows
  - Ellipsoids
  - Superquadrics
  - …





- How do glyphs convey information?
- How are parameters mapped to different glyph properties (color, size, shape, …)?
- Which properties are perceived faster (pre-attentive stimuli vs. attentive stimuli)

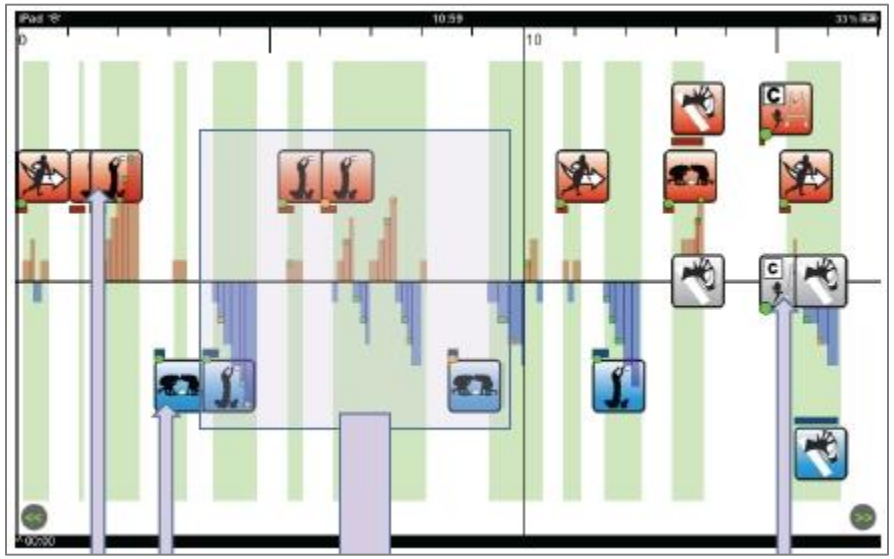
Vessel Visualization

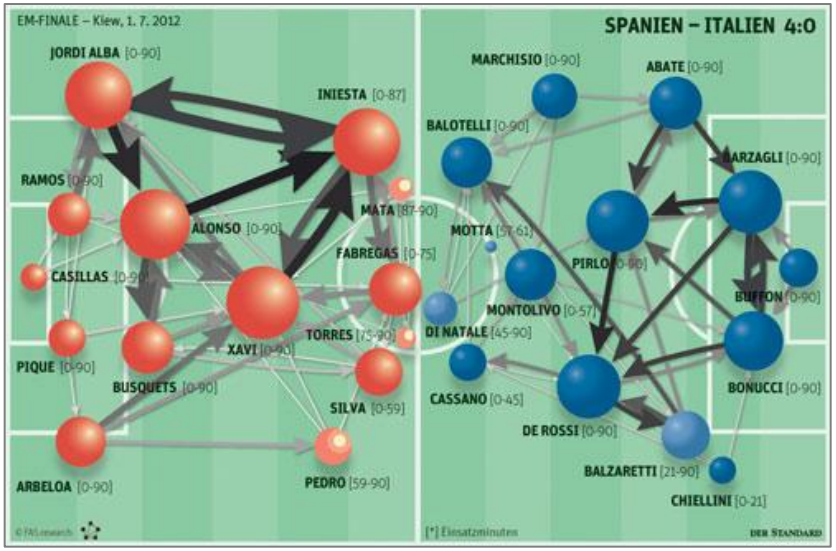
- Visually pleasing visualization of vessels
- Diagnostic relevant visualization methods

- How are the vessels rendered?
- What are visualizations application areas?

Sports Visualisation

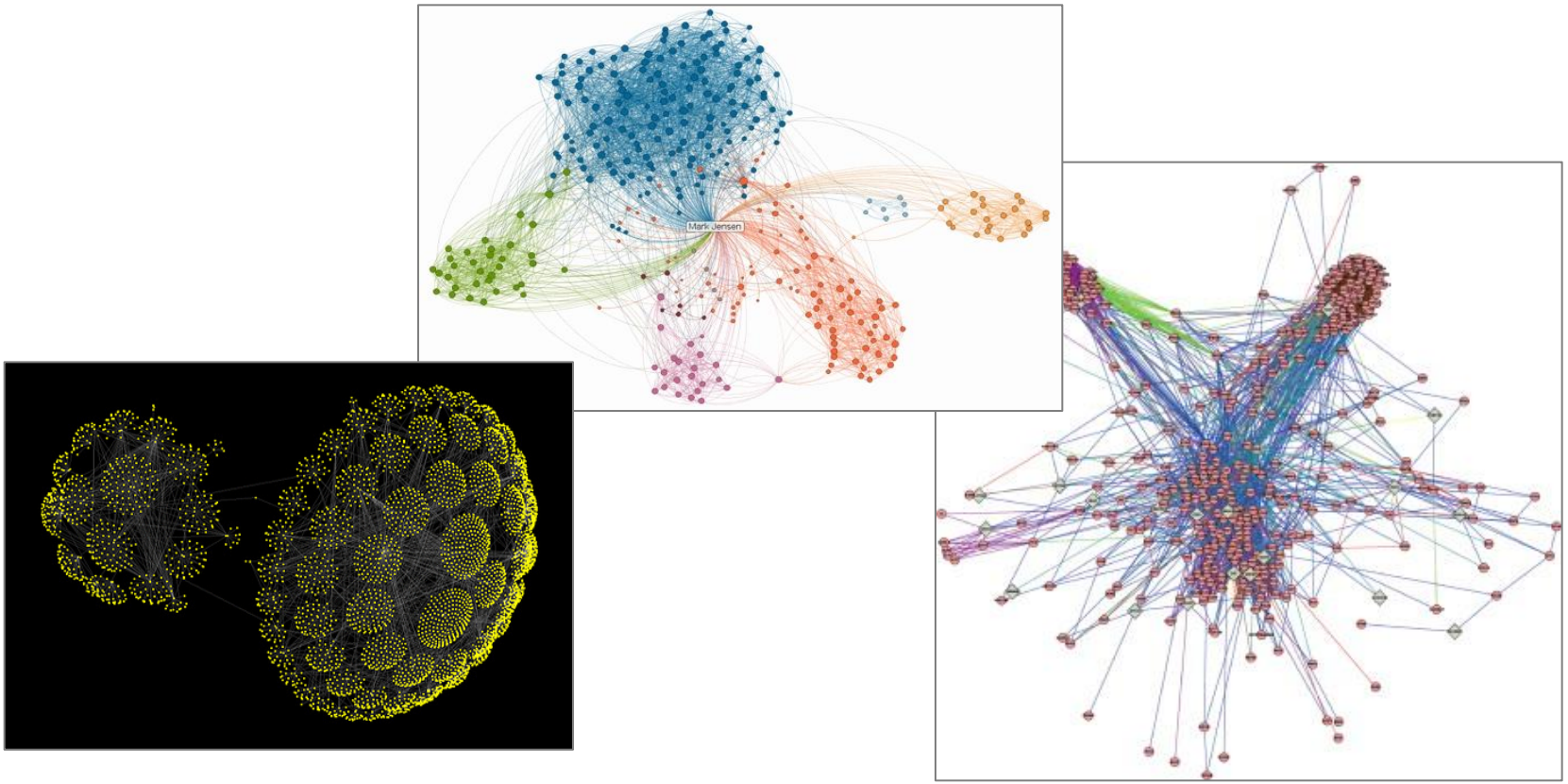
- Visualisation of sports events
  - Tracking events during sports meetings
  - Statistics





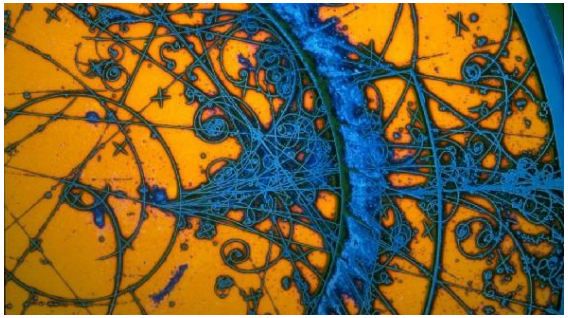
Large-Scale Network Visualisation

- Visualisation of large-scale networks (internet, social networks, flight data...)



From the Smallest to the Biggest

- Visualization of natural phenomena at different scales
- Organize visualizations by size and distance
- From scale of nano-objects to scale of stars
- Describe capturing of data and visual mapping method



Bubble Chamber Trails

Hubble Deep Field

Realistic Skin Rendering

- Computer graphics
- Game engines
- Movie industry
- Simulations

Topics 2012

- Uncertainty Visualization
- Parameter Visualization
- Volume Editing
- Pre-integration in Volume Rendering
- Focus+Context Techniques
- Procedural Content Generation
- Glyph-based Visualization
- Vessel Visualization
- Sports Visualisation
- Large-Scale Network Visualisation
- From the Smallest to the Biggest
- Realistic Skin Rendering

LaTeX

A very short introduction to LaTeX

- „Programming“ a text document
- Similarities to HTML
- No WYSIWYG
- Most convenient to use a LaTeX distribution and a LaTeX IDE (integrated development environment)

A very short introduction to LaTeX

- First install a LaTeX Distribution
  - MiKTeX (for Windows)
- Then a LaTeX IDE
  - TeXnicCenter
  - Texmaker
  - LEd

A very short introduction to Texmaker

- Extract the archive *acmsiggraph.zip*
- Open *template.tex* in *Texmaker*
- *Tools -> LaTeX*
- *Tools -> BibTeX*
- *Tools -> LaTeX*
- *Tools -> LaTeX*
  - LaTeX has to be executed two times in order to generate correct references
- Tools -> DVI->PDF

A very short introduction to LaTeX

- Work with 2 files:
  - A *.tex* file for the text
  - A *.bib* file for the bibliography which is used by the citations command \cite

Questions?

http://www.cg.tuwien.ac.at/courses/WissArbeiten