METK – The Medical Exploration Toolkit

www.metk.net

Konrad Mühler, Christian Tietjen, Bernhard Preim

University of Magdeburg, Germany

VIS

Motivation

Application development is guided by the usage of software libraries and toolkits. For medical applications, the available toolkits focus on image analysis and volume rendering. User interface and exploration issues are not adequately supported. Hence, the METK provides a large variety of facilities for application development. The METK is based on the rapid prototyping platform MeVisLab. Therefore, no extended programming skills are needed for application building using a graphical programming approach. The METK is freely available and can be downloaded at www.metk.net.

The METK includes:
- Advanced medical visualizations and exploration techniques
- Standardized documentation
- Interface widgets for common tasks
- Script-based animation facilities
- Automatic viewpoint selection
- Several illustrative rendering techniques
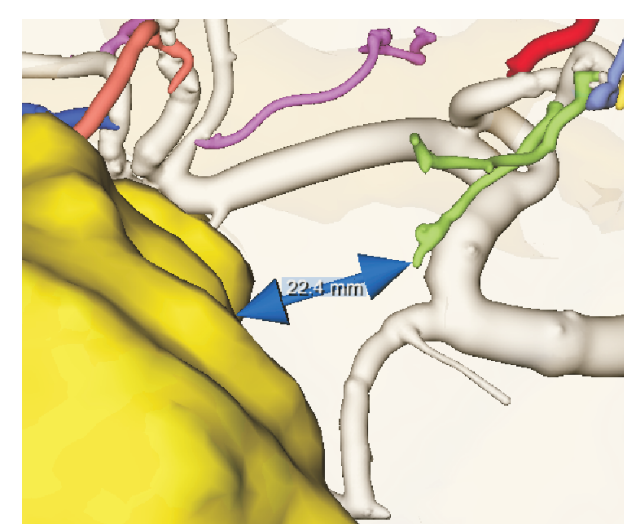- Object selection in complex and transparent 3D scenes
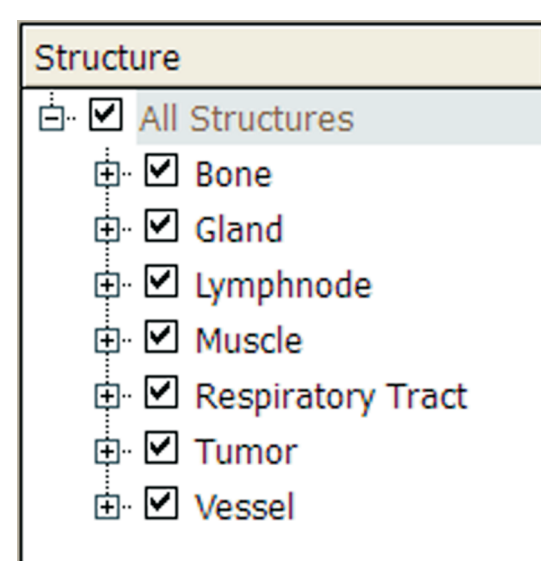
Exploration Layer
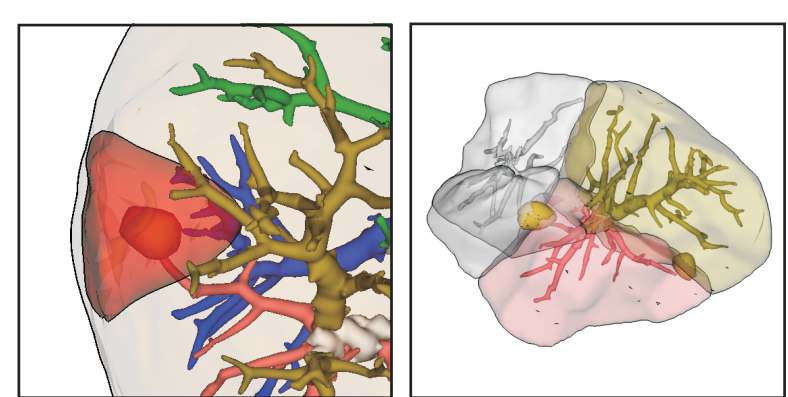
Key States and Undo Facilities
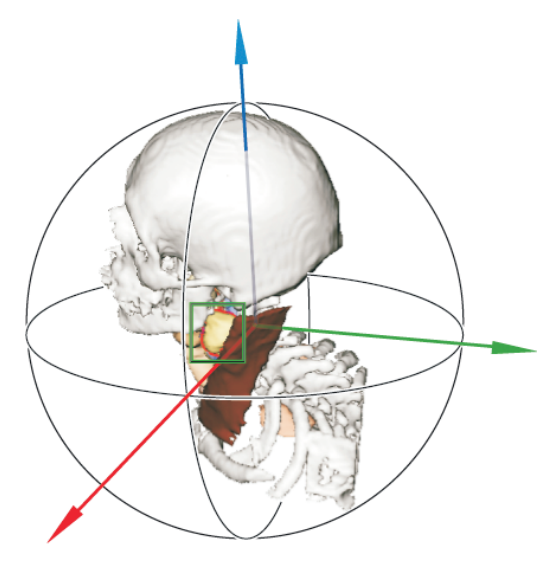
Object Selection and Fast Object Manipulation
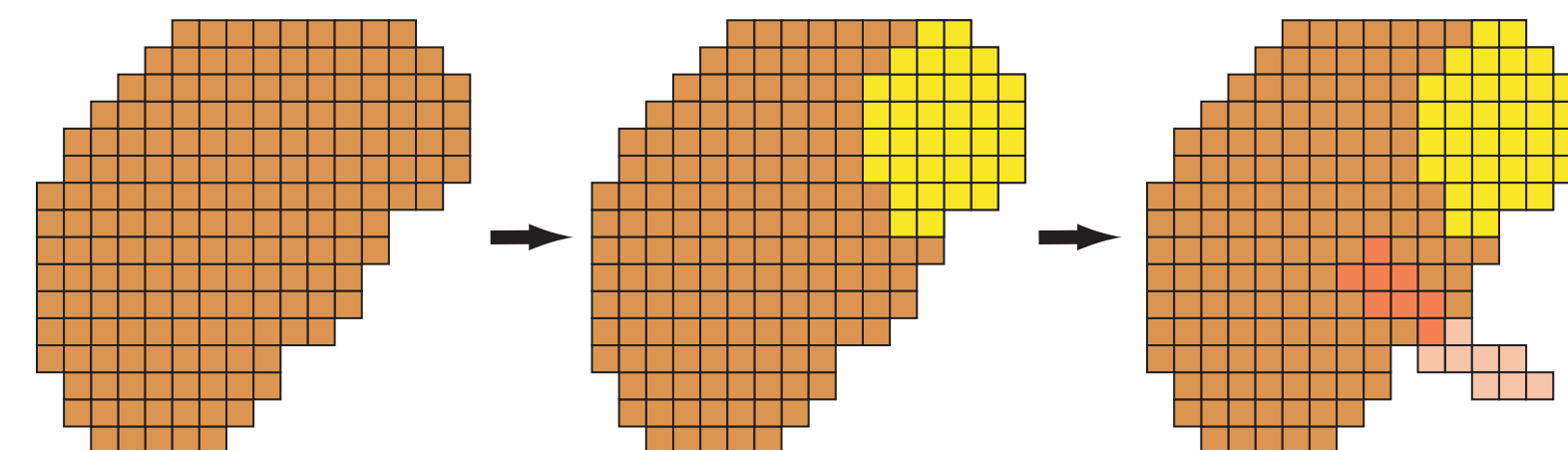
Measurement Tools

Widgets and Layout Templates
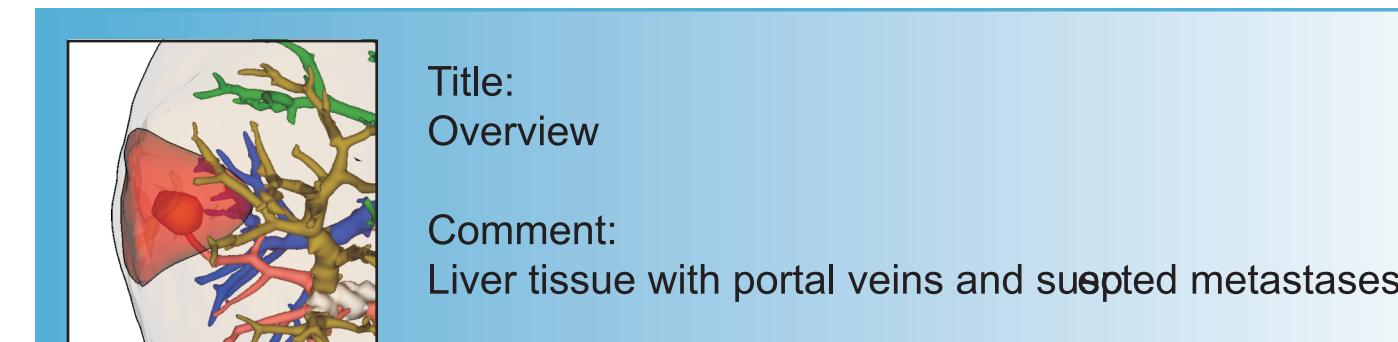
Animations

Viewpoint Selection

Visualization Layer

Viewer

Colored 2D Overlays using Multi Coded Segmentation Masks

Lift Chart

Volume Rendering
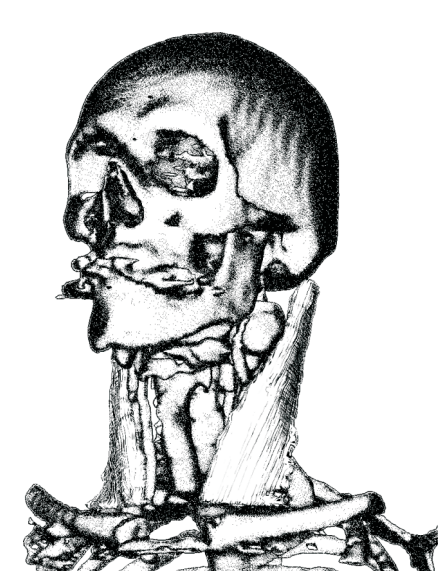
Illustrative Visualizations

Colored Isosurfaces

Data Management and Communication Layer
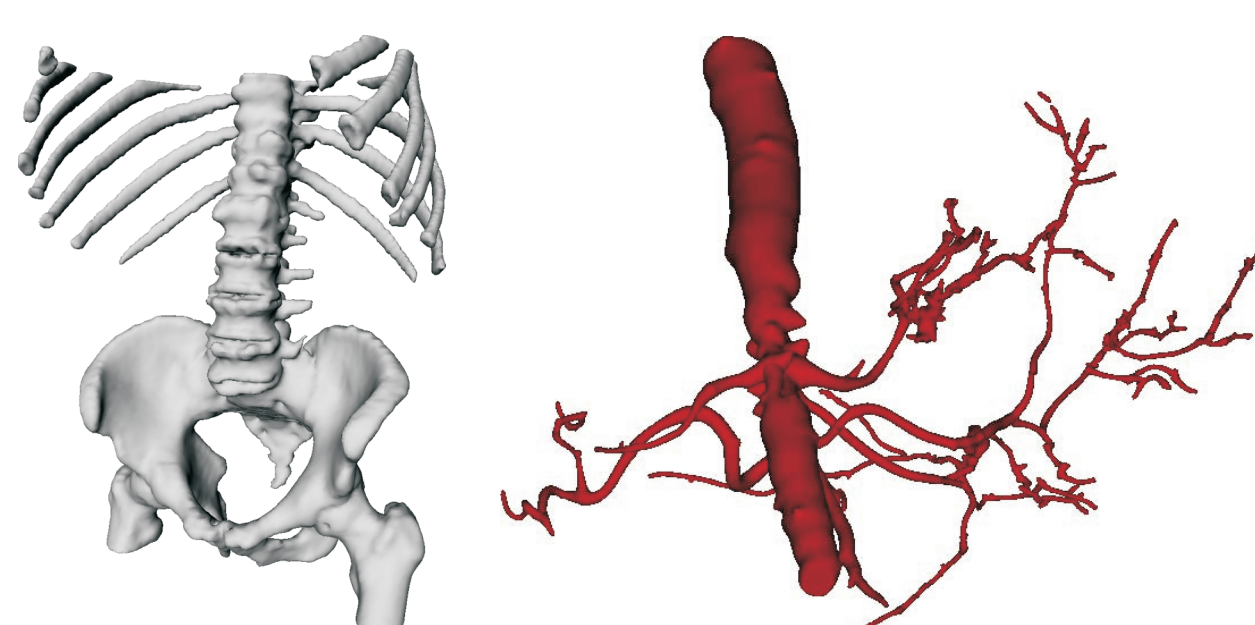
Smooth Isosurfaces and Vessel Visualizations
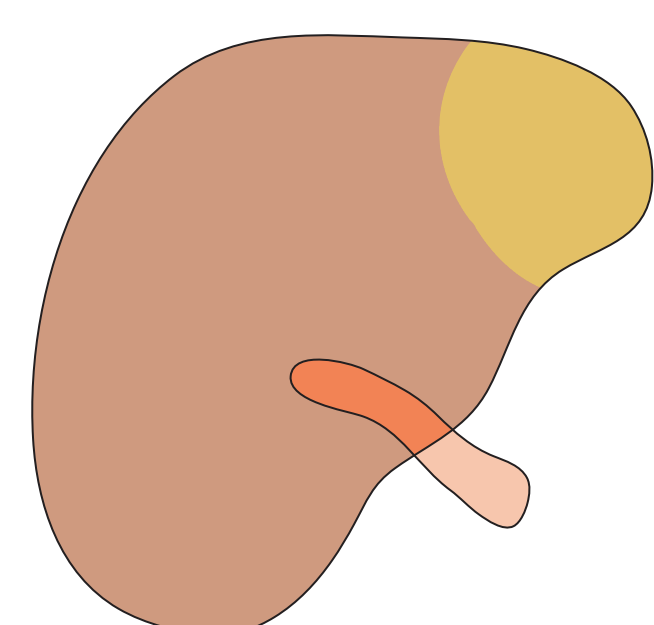
Multi Coded Segmentation Masks

MRI and CT Images

Segmentation Masks
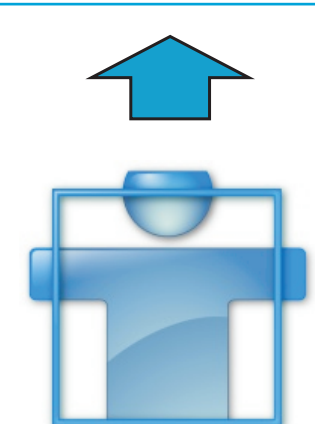
Basic MeVisLab Functionality

Multi Coded Segmentation Mask

1	Liver
2	Liver , Tumor
3	Liver , Hepatic Artery
4	Hepatic Artery
5	Liver , Hepatic Vein
6	Liver , Tumor , Hepatic Vein

- Usually, each segmentation mask is stored in a single file
- Memory and performance inefficient
- Not more than 64 structures
- Overlapping not possible

- An MCSM contains all segmentation masks
- Mapping of voxel values to structure lists is stored in the case data.
- Upper bound of 2^{64} masks

Key States

Title: Overview

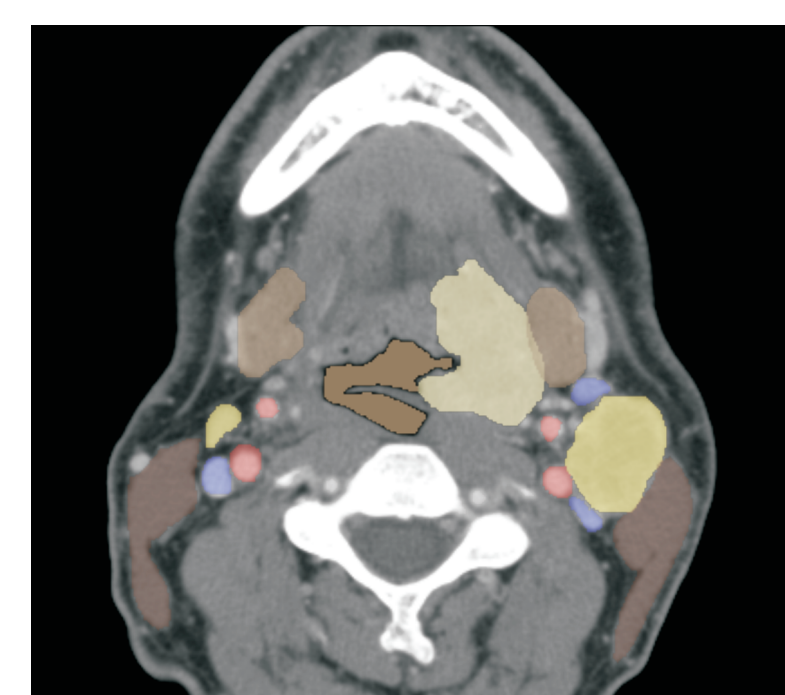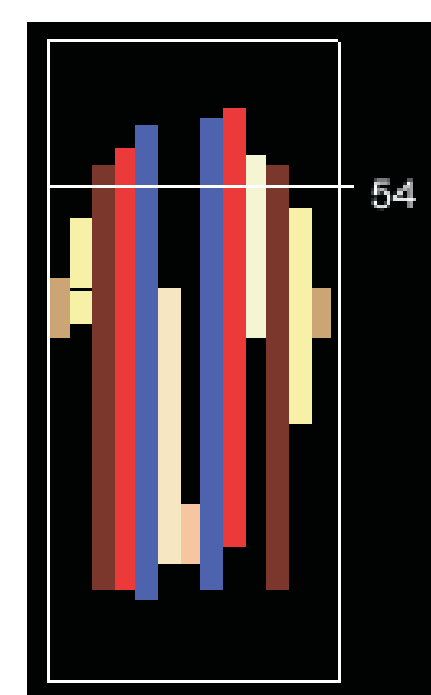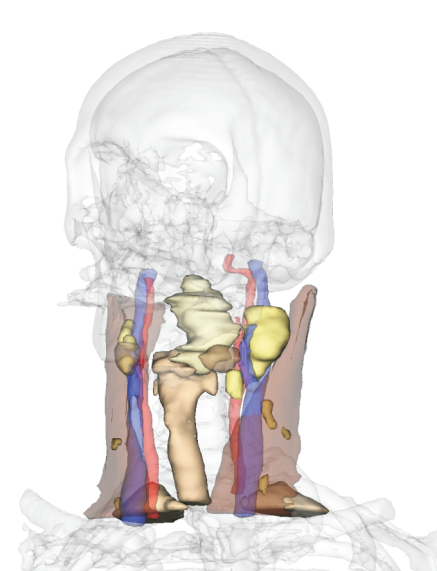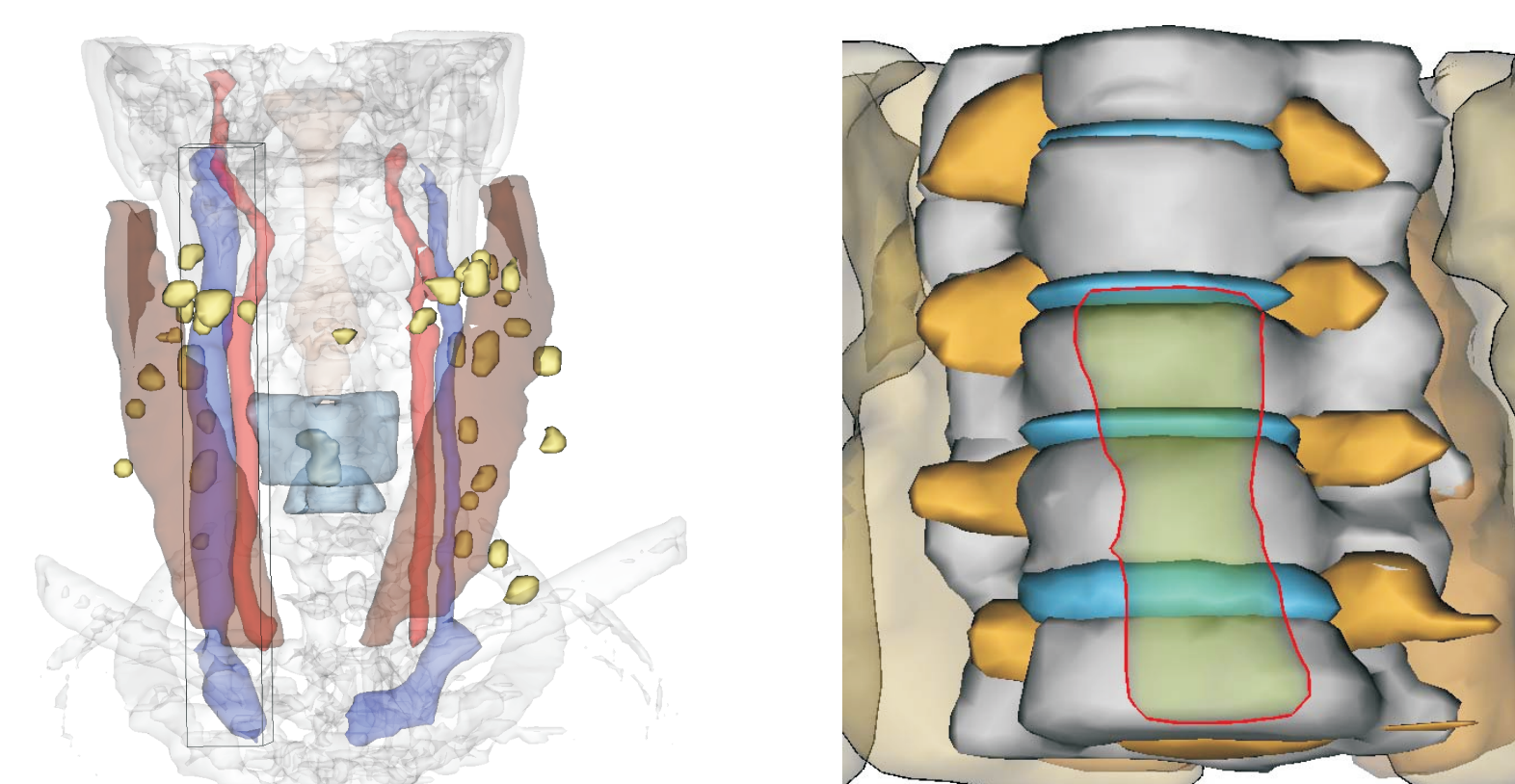Comment: Liver tissue with portal veins and suspted metastases

Title: Liver territories

Comment: Affected territories for two central metastases

- Several views on the explored data need to be saved
- Key state stores necessary information
- Additional screenshot, title and comment
- Automatic video generation between a set of key states
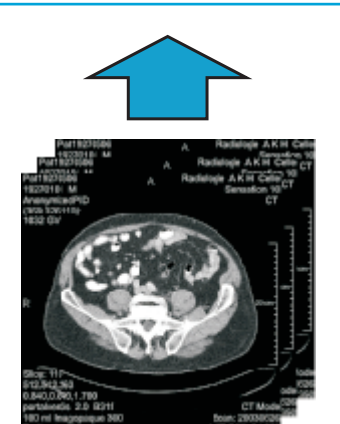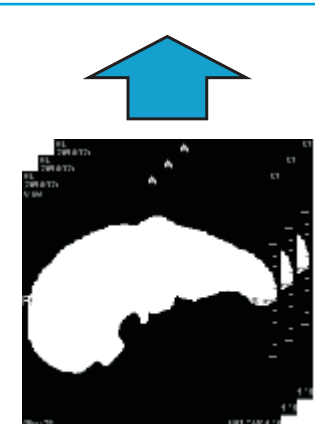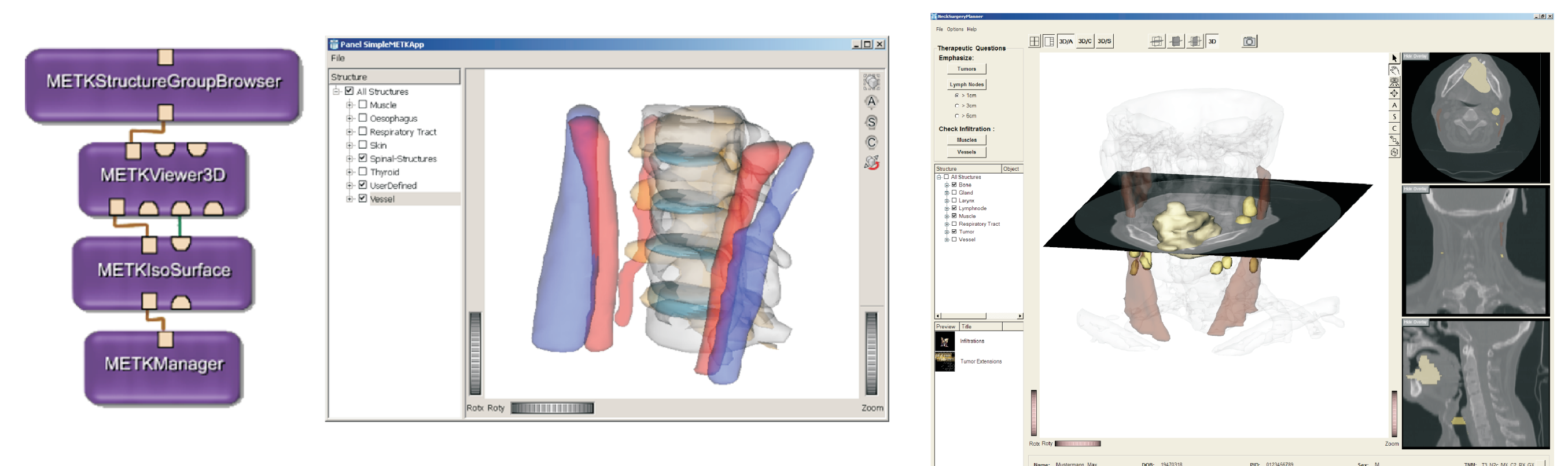
Object Selection

- Problem: desired object is hidden by transparent object
- Mouse is pointed consciously
- Less perception of very transparent objects
- Impact of transparency and the bounding box size
- Limitations: structure is underlaid by opaque

Application Building

Contact:
Konrad Mühler - info@metk.net - www.metk.net

OTTO VON GUERICKE UNIVERSITÄT MAGDEBURG VIS