Project Option 1: Brain Visualization for Surgical Planning

This project is based on the 2010 IEEE Visualization contest. IEEE Visualization is the premier conference for visualization research. The goal of the contest was to provide visualizations to help neurosurgical planning.

The main goal of this project is to provide visualizations that allow the preoperative planning for neurosurgical interventions. The primary challenge in planning neurosurgical interventions lies in the identification of the various structures at risk and understanding how they relate and interact with each other.
The most relevant risk-structures are functional areas located in the gray matter on the cortex and white matter fibre tracts connecting different areas. During surgery, both need to be treated with equal care. Damaging a functional area or a connecting WM tract will result in serious patient impairment.
Therefore, the task in neurosurgical planning is to identify all related risk-structures, their spatial relation to the lesion that's target to resection, as well as a safe access path to that lesion. Multimodal visualization should support the surgeon in performing this task.
More specific questions can be found in the Clinical Questions section on the contest website. The two main goals are the identification of the relation between the lesion, functional areas and white matter tracts and how the lesion be accessed most safely.
You will design and implement a visualization solution that can aid surgeons to find right answers to some or all of the questions. The description of the challenge itself indicates what is relevant.

You can also find the original submissions and winners of the contest on the website. We encourage you to look at them for inspiration, but do not copy them.

Further read: IEEE SciVis 2010 Contest Website

Data: https://sciviscontest.ieeevis.org/2010/data.html