# MITK Plugin for Deep Brain Stimulation Planning*

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CONTEXT

- Deep Brain Stimulation (DBS) is a neurosurgical treatment consisting in implanting an electrode in a deep structure of the brain: The subthalamic nucleus (STN).
- The placement of the electrode is subjected to a set surgical rules.
- Brain tissues may deform during the surgery and alter the pre-operative planning. This phenomenon is known as brain shift (BS).
- We are invistigating a patient-specific automatic planning for the placement of a DBS electrode inside the STN, and which anticipates the BS. The works are done based on the MITK plateform.
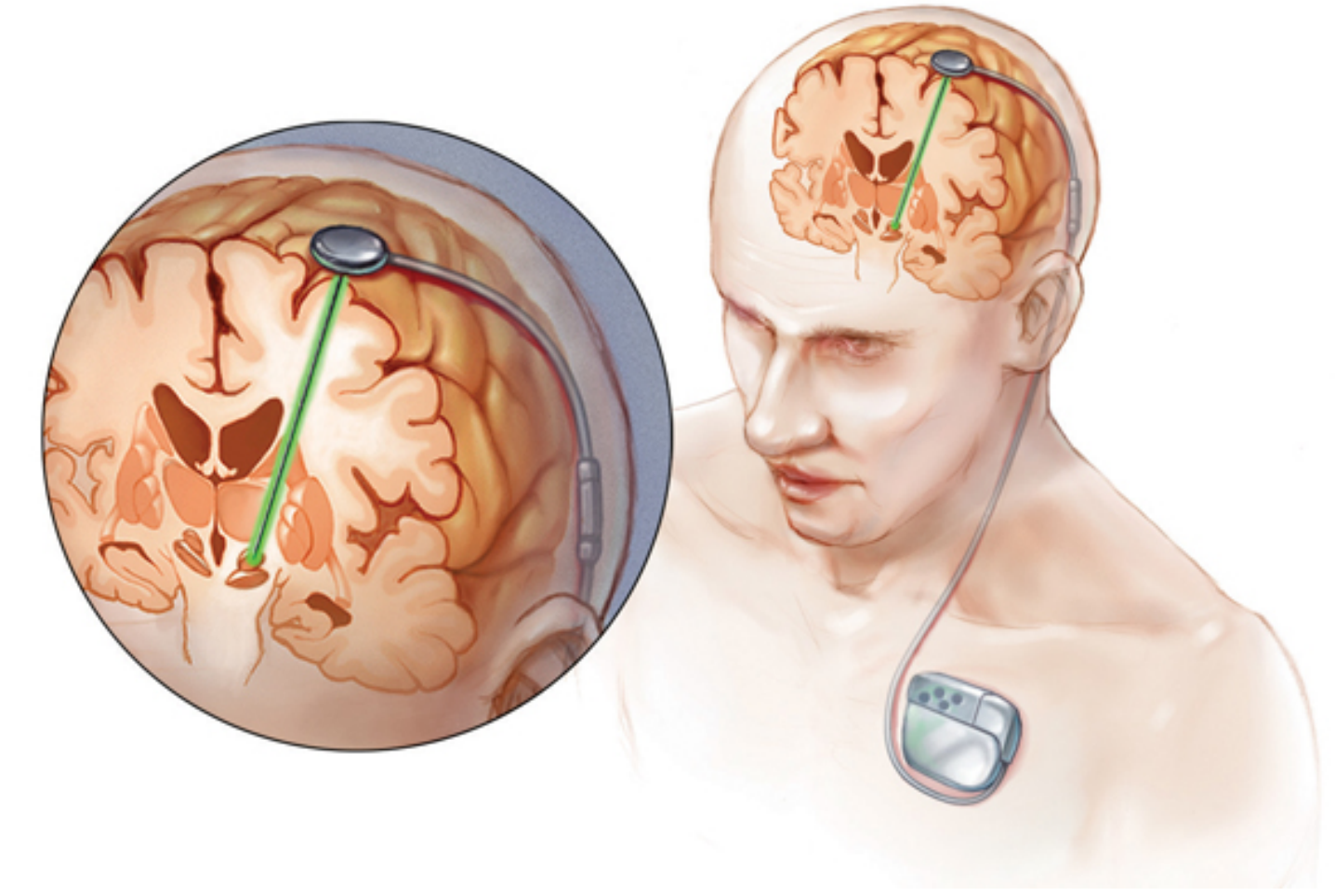

DBS Illustration¬

BRAIN SHIFT

Deformation of the cortical sulci of the left hemisphere due to brain shift in three different views from left to right: Sagittal, axial, oblique. Only 3 BS levels are shown.
Gray mesh: No brain shift - Green mesh: Medium brain shift - Orange mesh: Maximum brain shift. On the rightmost: Zoom on the the anterior part of the brain in sagittal view.
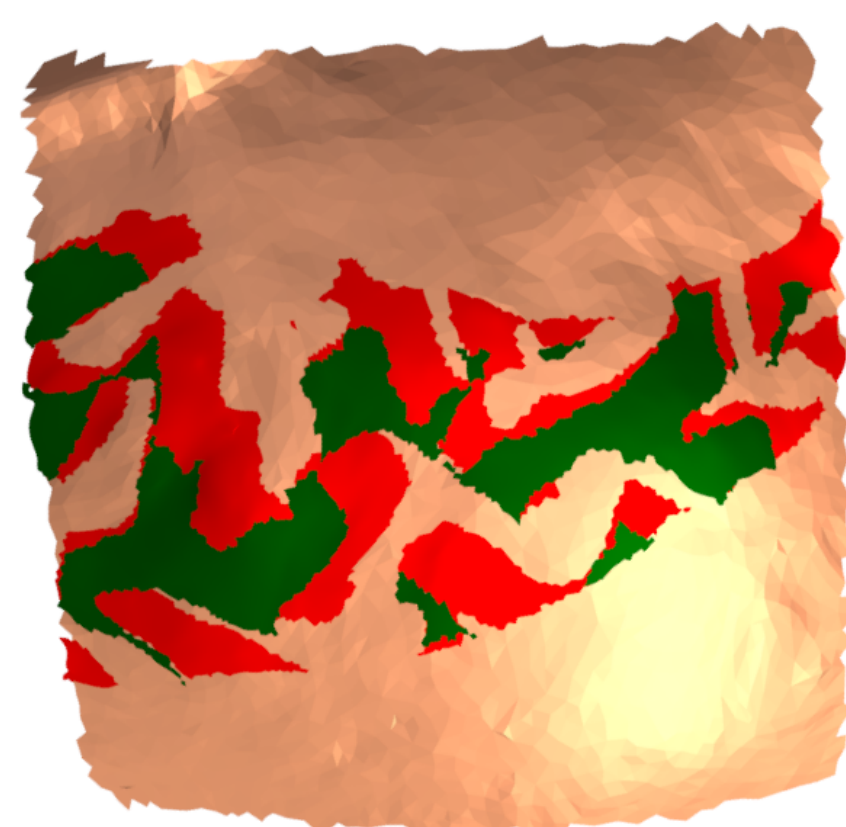
OVERVIEW OF THE SYSTEM
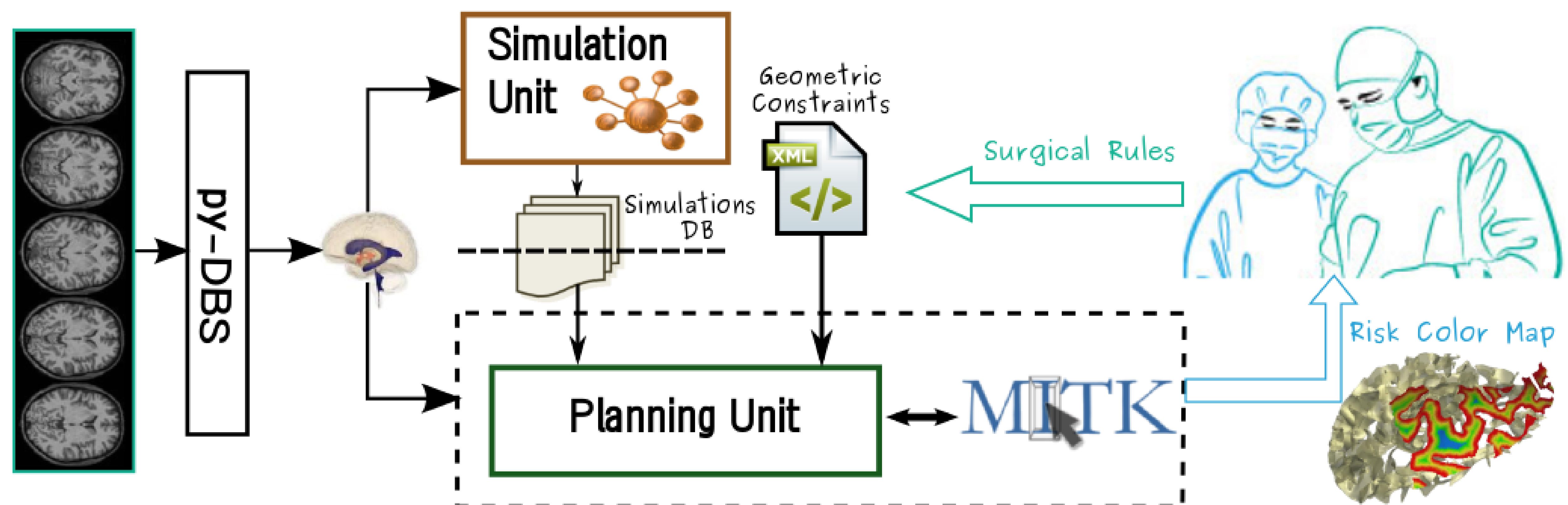
RESULTS
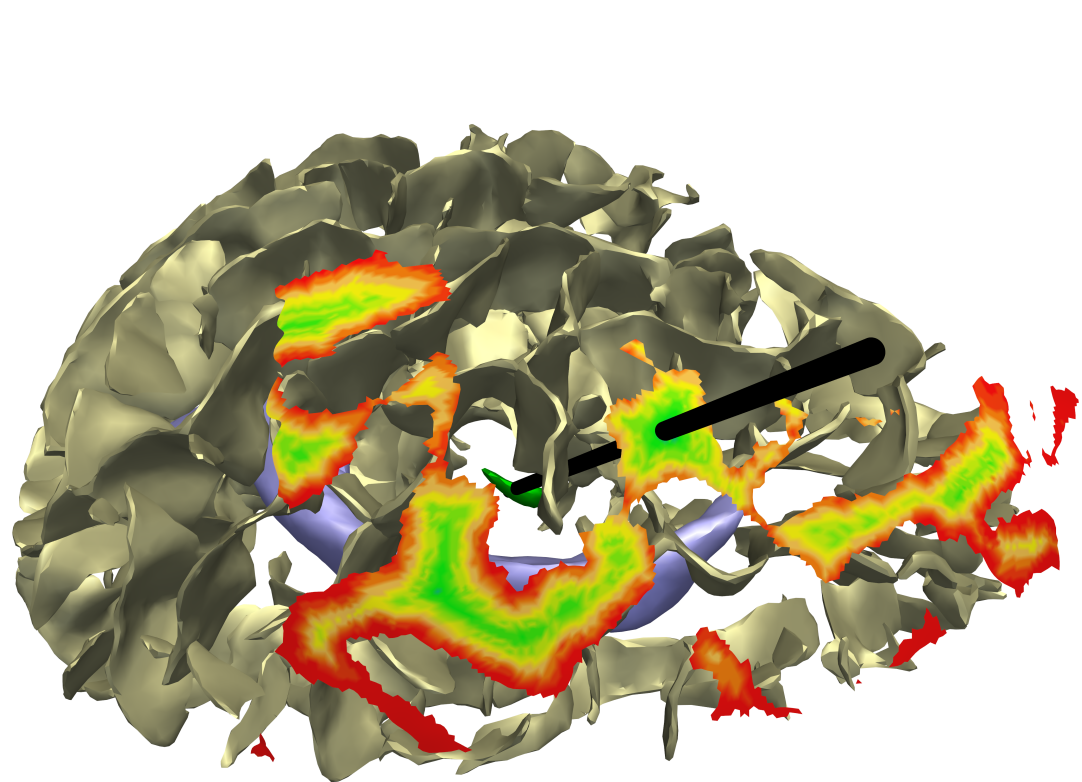
Brain shift aware risk color map
with optimal planned electrode

Feasible insertion zones
Red & Green: without considering BS
Green: considering BS

- A generic trajectory planning tool, which is independant of surgical rules, and capable of integrating new ones.
- A color risk map on which the optimal electrode(s) placement(s) are located.
- Possibility of comparing between the feasible insertion zones with and without brain shift.
- The developed MITK plugin offers various interaction facilities for surgeons.