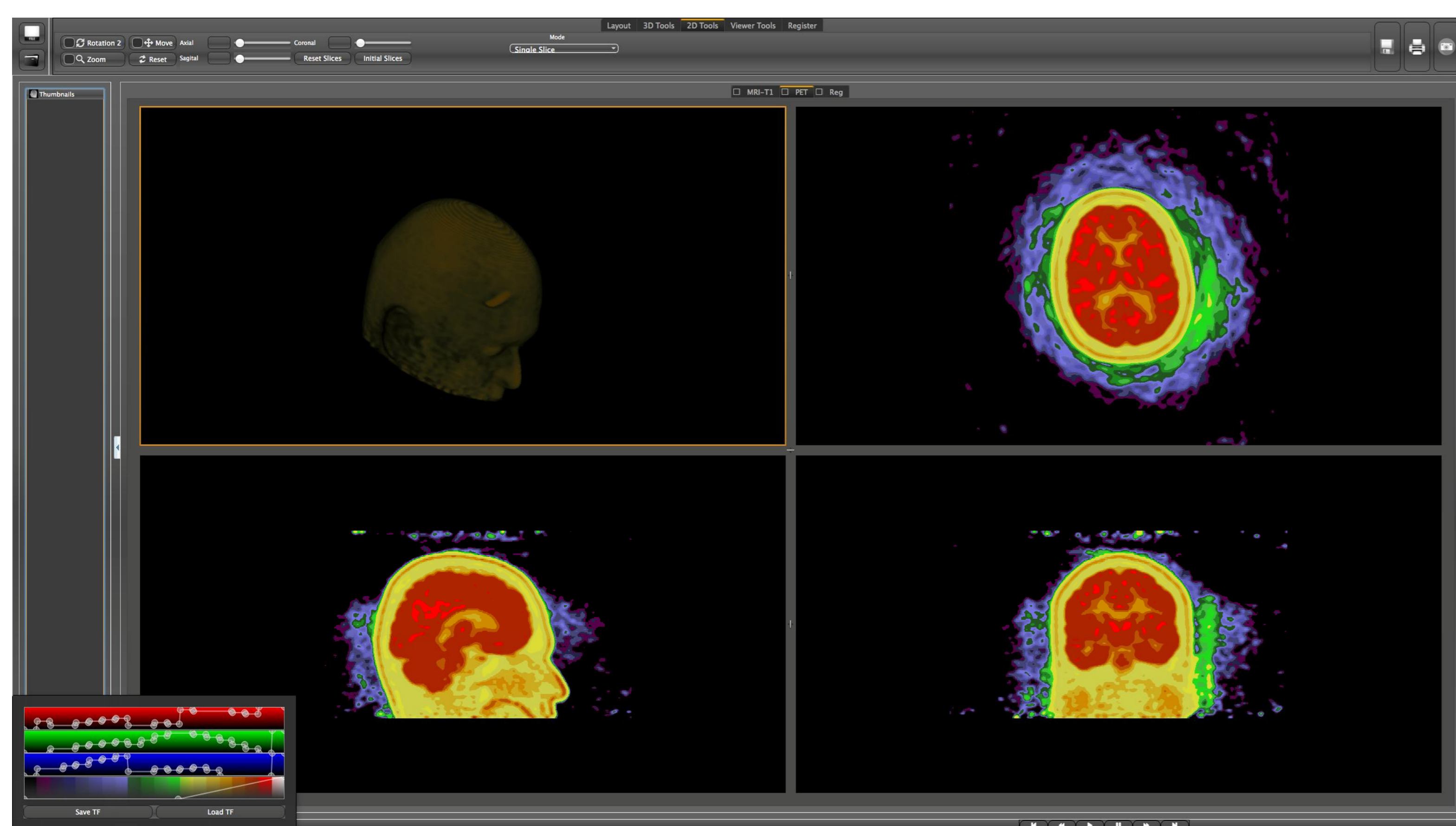


# User Interface Design for Assisting Diagnosis of Focal Cortical Dysplasia

**Rationale:** Patients with focal cortical dysplasia and refractory epilepsy usually require surgical intervention for seizure control to improve their quality of life. However, due to the focal and subtle nature, the diagnosis of epileptogenic foci with high-resolution structural magnetic resonance (MR) images still remains a challenge. For this reason functional scans, such as positron tomography (PET) and single photon emission computed tomography, have been successfully used as complementary information to increase the diagnosis accuracy. Our work aims at designing a graphical user interface (GUI) for an integrated diagnosis environment application that helps neuroradiologists to be more effective and efficient in their findings.

**Materials and Methods:** Because our prospective users are unsure of their needs, we adopt the user-centered spiral design model for our project. This model consists of four phases: planning, risk analysis, engineering and evaluation. The usability testing of the prototype developed in the first spiral reveals the following issues: (1) lateralisation hint; (2) coordinated views of MR and PET; (3) image savings; (4) flexible reformatting; (5) number of interactions per task; (6) image exhibition area; (7) working session saving; (8) transfer function edition.

**Results:** After the analysis of the user's opinions and the diverse GUIs of well-known medical visualization tools, namely OsiriX, Amira, Philips Arya, FreeSurfer, 3D Slicer, Mango and MRIcro [2], a new GUI was conceived. Its layout is presented in the figures captured from different platforms: Windows (a). Mac (b) and Linux (c).

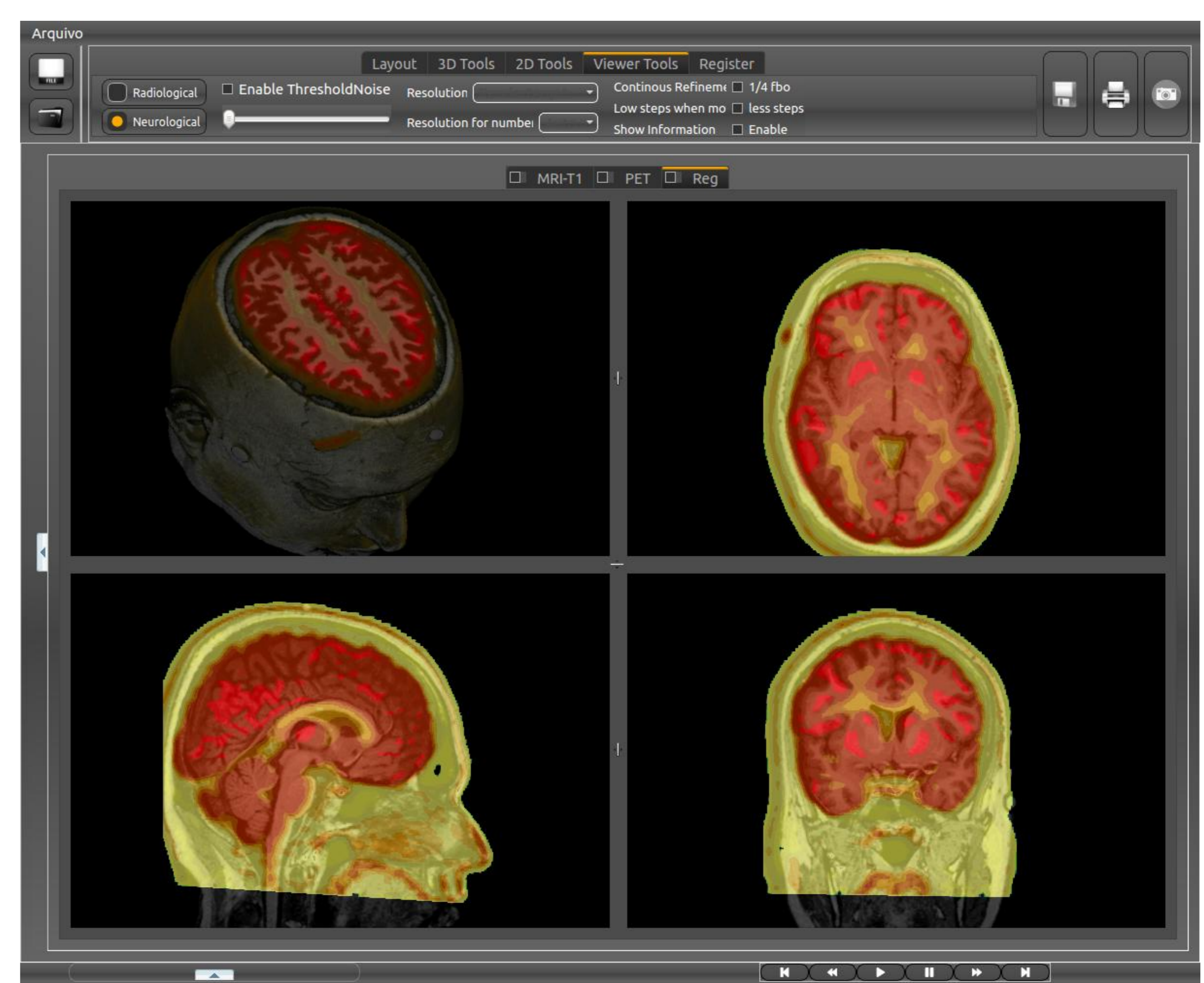


(b)

**Discussion/Conclusion:** When the appearance (user interface) of an application is changed, most of previously developed codes, such as multiplanar and curvilinear reformatting and multimodal registration, should be re-structured for tailoring to the new GUI. Currently, we are in the engineering phase of the second spiral, i.e. in the phase of the implementation and testing of the codes. Most of the old codes have been revised and updated to meet the technical specifications of the most current versions of OpenGL API [3]. Although the new GUI has not been completely concluded for usability evaluation among the prospective users, the iterative and incremental coding tests we are performing along the project development show that at least the cross-platform compatibility and efficiency requirements will be satisfied.



(a)



(c)

**References:** [1] Qt Project. <http://qt-project.org/>. Accessed Feb 2015; [2] List of neuroimaging software. [http://en.wikipedia.org/wiki/List\\_of\\_neuroimaging\\_software](http://en.wikipedia.org/wiki/List_of_neuroimaging_software). Accessed Feb 2015; [3] OpenGL 4.5 Reference Pages. <https://www.opengl.org/sdk/docs/man/>. Accessed Feb 2015.