# Building bridges between complementary medical image analysis platforms
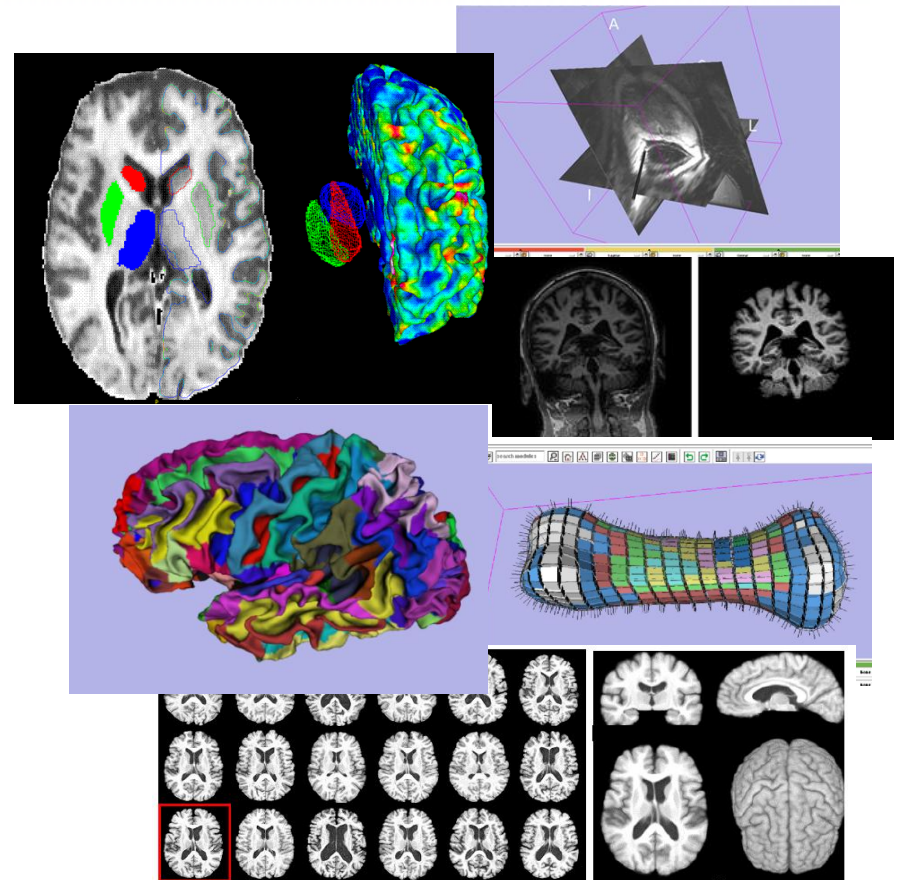
## Sonia Pujol, Ph.D.

Surgical Planning Laboratory

Harvard University

# **Medical Image Analysis Platforms**

- FreeSurfer

- BRAINS
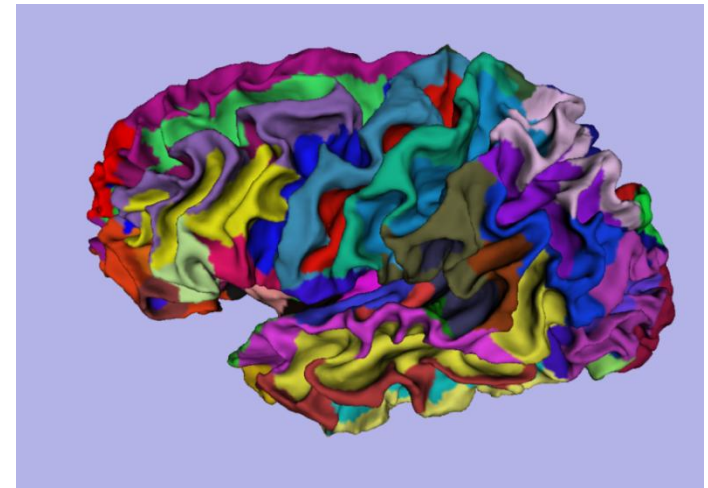
- HAMMER

- SPECTRE

- IA-FE Mesh

- OpenIGTLink

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# FreeSurfer

**Description**: FreeSurfer is research software for cortical surface parcellation and automated brain morphometry

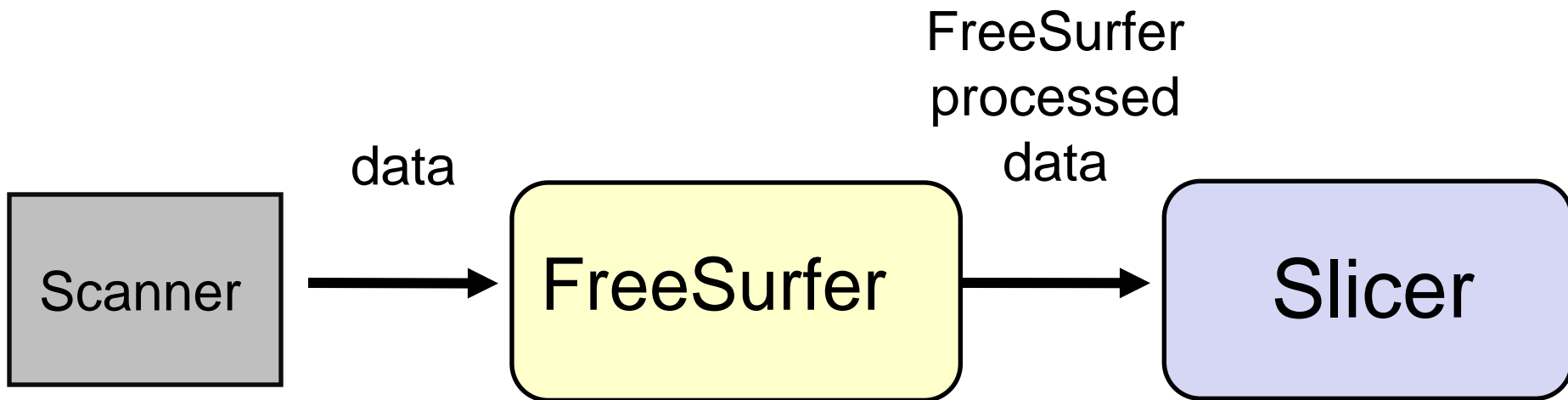**Integration**:  3D visualization of volumes, surfaces and statistics overlays.



**Advantages**: Interactive visualization, integration with other data (e.g. DTI)

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# **FreeSurfer integration**



Scanner → data → FreeSurfer → FreeSurfer processed data → Slicer

# BRAINS

**Description:** Comprehensive neuroanalysis research tool with optimized ITK-based registration

**Integration**: Command line module

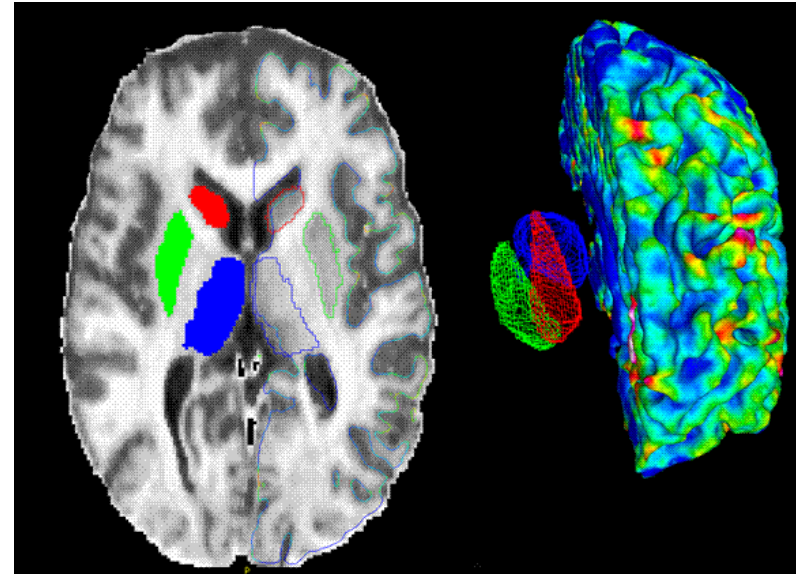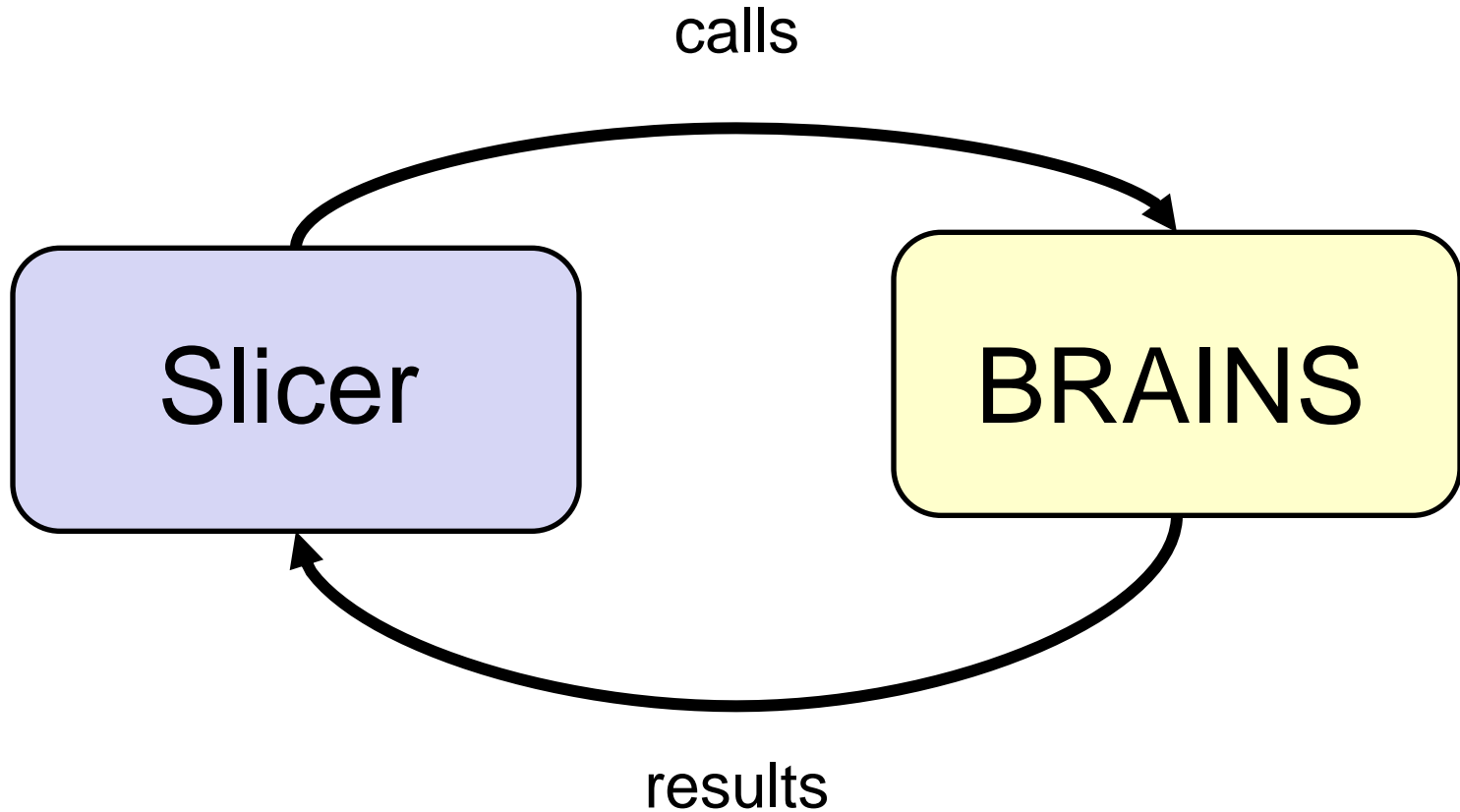**Advantages:** Interactive front end integration (e.g. prostate, IGT)



Image Courtesy of Vincent Magnotta, Ph.D. and Hans Johnson, Ph.D.

Sonia Pujol, Ph.D.

# BRAINS integration

# HAMMER

**Description:** Specialized research tool for segmentation, lesion detection and registration of neuroimages

**Integration:** Command line module

**Advantages:** Open-source infrastructure, distribution and visualization
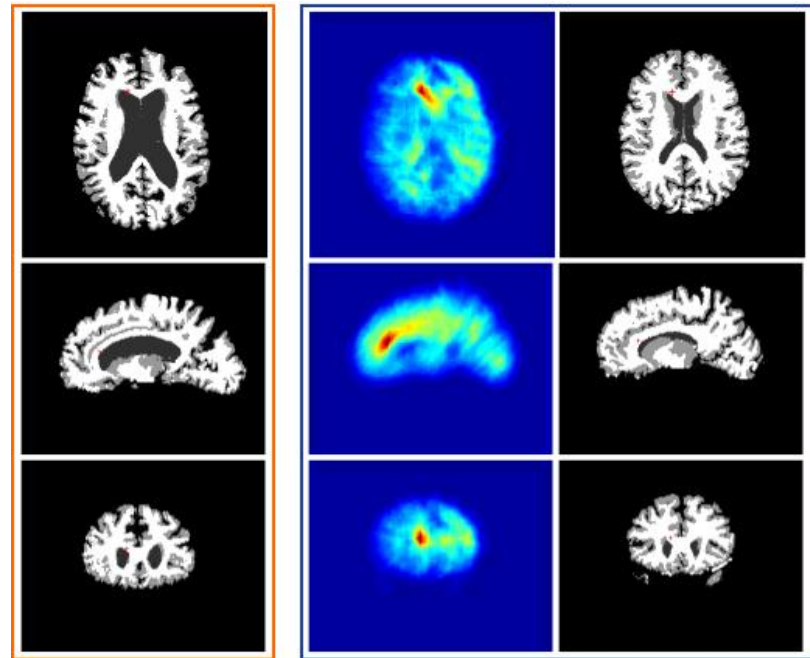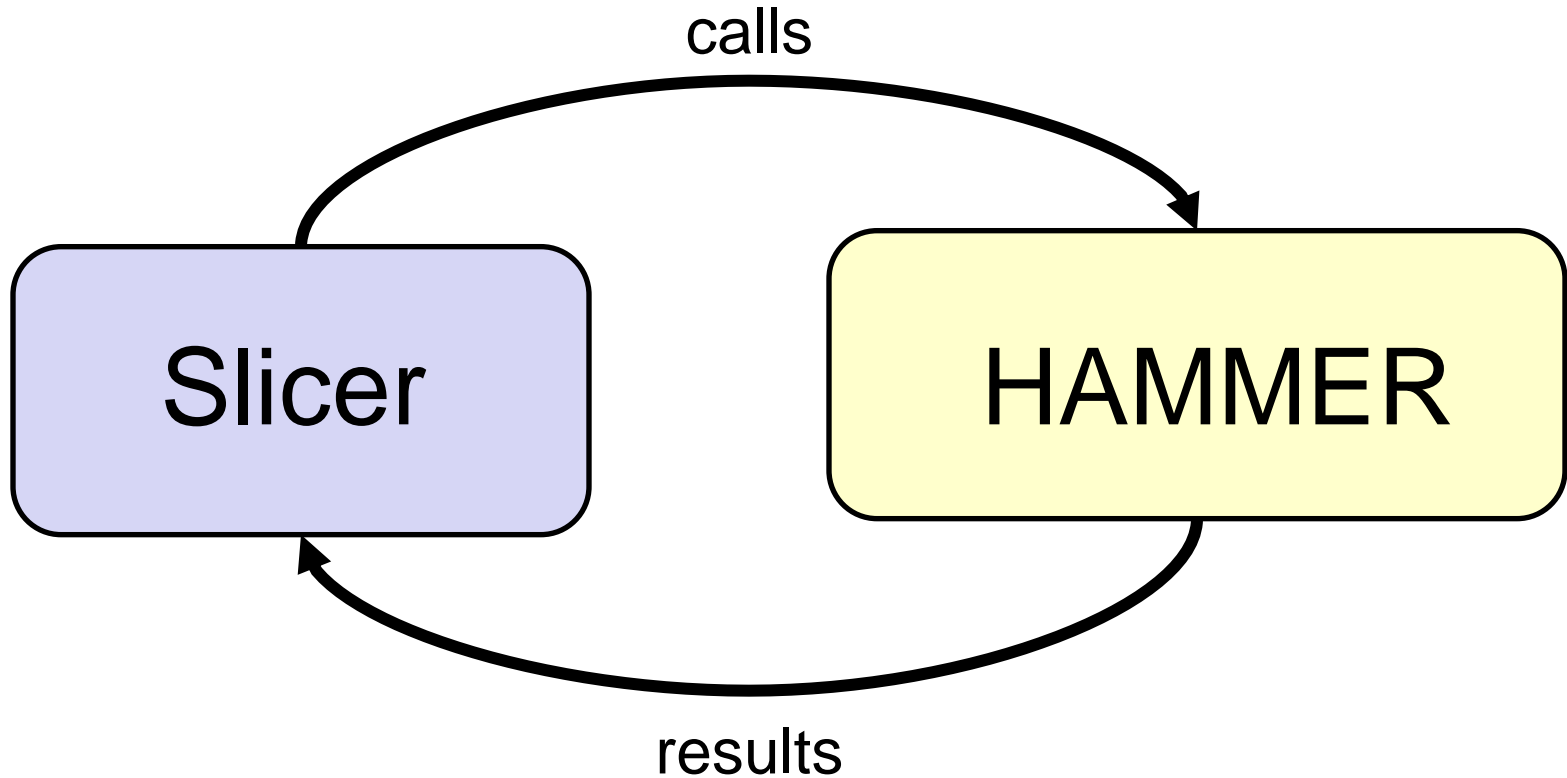


Image Courtesy of Dinggang Shen, Ph.D.

# HAMMER integration

calls



Slicer

HAMMER

results

# SPECTRE

**Description:** Skull Stripping component of the CRUISE (Cortical Reconstruction Using Implicit Surface Evolution) platform

**Integration:** Command Line module in Java



Image Courtesy of Jerry Prince, Ph.D.

**Advantages:** Visualization platform for output data and access to batch make capabilities

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# **SPECTRE integration**



Slicer

SPECTRE

Brain Atlas
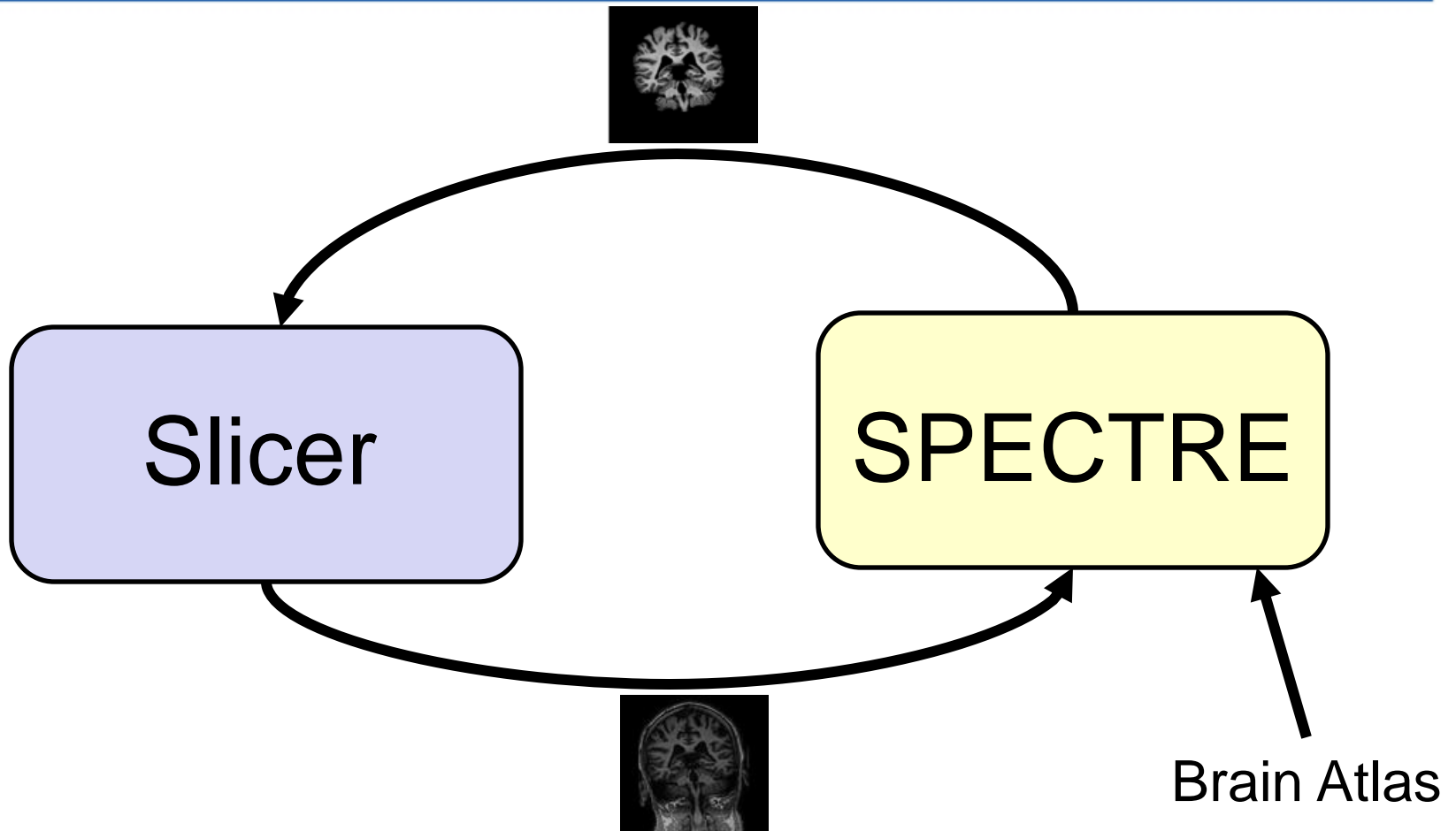
# IA-FE Mesh

**Description:** open-source software for Finite Element Meshing of biological structures

**Integration:** Loadable module in C++



Image Courtesy of Nicole Grosland, Ph.D. and Vincent Magnotta, Ph.D.

**Advantages:** End-to-end analysis context, open source infrastructure, distribution and unified visualization of original data and segmented mesh
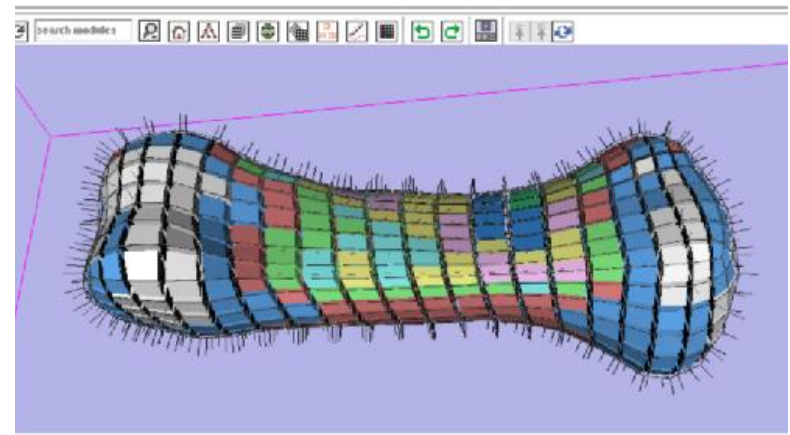
# IA-FE Mesh integration

Slicer

IA-FE Mesh

# OpenIGTLink

**Description:** OpenIGTLink is an open-source protocol and library for IGT

**Integration:** Client-Server

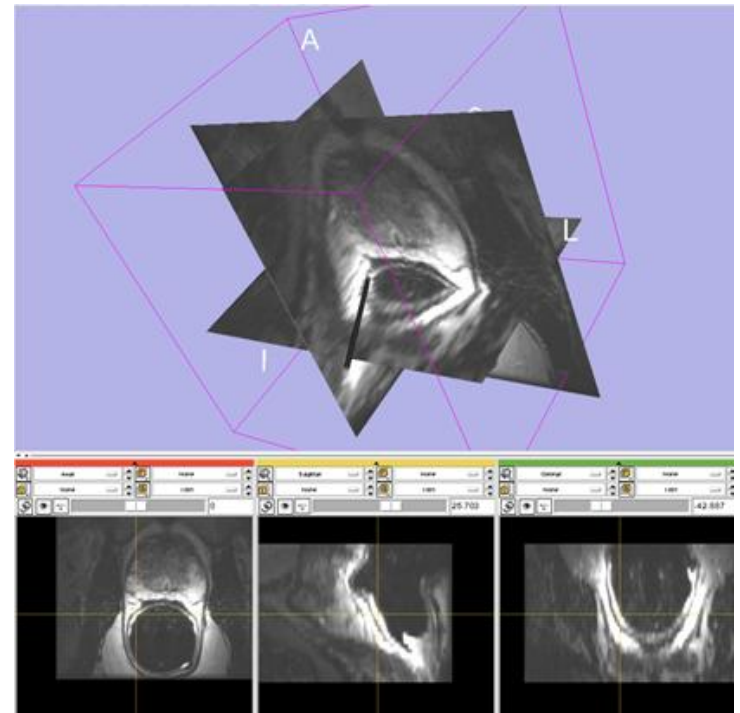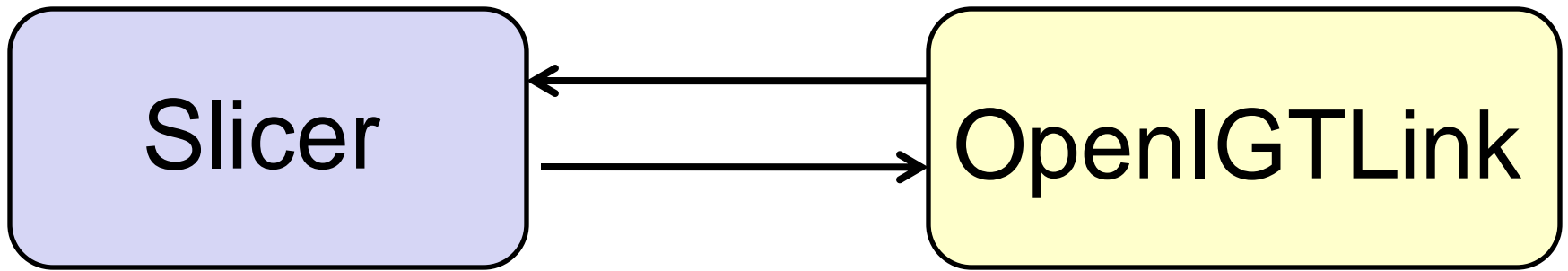**Advantages:** Integration with commercial FDA approved devices



Image Courtesy of Nobuhiko Hata, Ph.D.

# **OpenIGTLink**



Network communication

# Summary

- Multiple implementation options: C++ (ITK, VTK), Java, Python …

- Multiple levels of customization: interactive loadable modules, command line modules, data interoperability, network communication

- Diverse application areas

# Acknowledgements

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