# Using 3D Slicer for image-guided therapy research

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| Commercial application  | Research application  |
|---|---|
| Fully optimized for specific purposes   | Very flexible, fits many purposes, easy to customize/extend     |
| Simple, easy to use   | Complex, may be difficult to use                                |
| Fast, robust  | Might be slower, might have robustness problems                 |
| Uses closed source, in-house developed and maintained libraries                             | Uses state-of-the-art, actively developed open source libraries |
| Thoroughly tested, fully documented (fully FDA, CE compliant + as high quality as possible) | Tested & documented as reasonable (optimized for quality only)  |

### Without a strong application platform

- Completely new software was written for each procedure/device
- Each application was developed from ground up
- Significant work investment to integrate new, advanced algorithms

Quick start. Huge waste of time/money/effort overall.

## With 3D Slicer as application platform

- New software module for each procedure, common module for several devices
- Applications are built on top of 3D Slicer
- Many new, advanced algorithms are deployed on 3D Slicer

Huge investment at the beginning: learning.
Minimal wasted efforts.



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#### Image-guided therapy applications in Slicer 3.6 **ProstateNav** NeuroNav PerkStation Prostate biopsy Spine needle Neuro navigation insertion with AR Used on patients Used on patients display LiverAblation **IGTPlanning** Cadaver studies **IGTNavigation** MRAblation Laboratory for Percutaneous Surgery (The Perk Lab) - Copyright © Queen's University, 2010

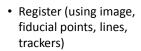
#### Generic IGT workflow steps

- Calibration: register patient/tools/image acquisition device
- Planning: import and visualize data, create plan
- **Targeting**: perform the planned intervention with guidance
- Verification: evaluate, archive results



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# Import images (DICOM and other formats) Import object models (tools, etc.) Mark fiducials



Calibration



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- Import images, models
- Mark/segment target points, surfaces, volume regions
- Visualize (2D slices, 3D view, reformat, fuse, register)
- Measure (distance, angle, custom)

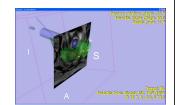


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#### **Targeting**

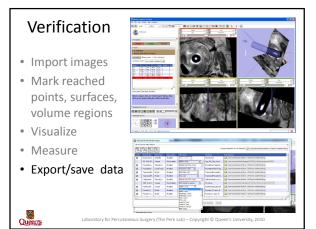
- Position tracking and real-time tool display (NDI, Ascension, ...)
- Import & display real-time images
- Robot, scanner control

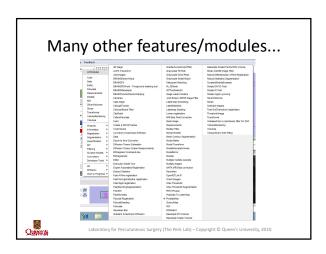


With compatible devices, using OpenIGTLink + IGSTK



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#### Summary

- Flexible, feature rich platform
- Not optimized for a specific procedure: custom module and/or add experienced user needed in the OR
- Continuous improvement, good support, large user and developer community
- No waste: most of the needed functions are already available, mostly built on standard open source libraries
- · Several successful examples

\$3D Slicer is strongly recommended as an IGT research application development platform.



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