CI4CC Spring Workshop Summary

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Workshop Structure

- Developer perspective
  - 5 academic groups
- Stakeholder perspective
  - 4 stakeholders
- User perspective
  - 3 users
DEVELOPER PERSPECTIVE
Development Best Practices

• You can **crowdsource development**
  – Annual development meetings: 3D Slicer, Bioconductor
  – Bioconductor and Genome Browser: modules/data contributed by the community, but not to the core source

• ... but a **Core Development Team is important**
  – A challenge is creating incentives to retain

• **Good software development practices** (core + crowd)
  – Bioconductor: Badges for code coverage

• Balancing **stability and innovation**
User and Developer Community

- **Answering questions:** Wait for the community (cTAKES, Bioconductor)
- **Fixing bugs:** Bait the community
- **Adding features:** Ask for similarities...seeding
- **Open Source Foundations:** can advise and provide IT to ‘manage’ communities
  - Apache
  - Open Health Imaging Foundation
Funding

- **Shotgun approach** – Multiple grants, which need an innovation component
- **Federated, community approach** – Others’ grants support project improvements
  - Slicer and Bioconductor
  - (but not for the core team)
- **Commercial funding of annual meetings**
- **Commercialization of one tool to fund another**
STAKEHOLDER PERSPECTIVE
NCI Perspective

Juli Klemm, NCI CBIIT

• Very interested in models for **sustaining high-value tools**
• **Open source models** allow for the broadest, least restrictive reuse of these resources
• **Collaboration** among tool teams
Regulatory Perspective

Mike McNitt-Gray, UCLA
Robert Ochs, FDA

• Creating FDA 21 CFR Part 11 is a significant, ongoing effort (i.e., very hard), particularly for academic groups

• Even small modifications may require resubmission

• Differences in requirements and policies for different types of software
  – i.e. Image analysis vs data management
Support Vendor Perspective

*Sri Adiga, Krishagni*

- **Sell support services for academically developed software**
  - No difference in “enterprise” and “community” edition
  - Another example: Kitware and 3D Slicer

- **Open source but...** Challenge to accept code contributions due to quality control issues

- Extensible via plug-in architecture
USER PERSPECTIVE
User Perspective

Jack London, Thomas Jefferson
Carmelo Gaudioso, Roswell Park

• Intimate user engagement during development lead to high satisfaction
• Great experience with user support from academic products
• Open source is a plus – interoperability, possibility to customize
• Software choices at cancer centers primarily driven by need
Developer > Commercial Transition

Tim Fox, Varian

• Velocity software developed to meet a scientific need at Emory
• Academic-industry partnerships are a good way to address sustainability and compliance needs
In Summary

• There are great academic tools out there
• How do we continue to make researchers aware of their existence and engage them?
• Commercialization opportunities are very project dependent
  – For projects needing expensive regulatory compliance, commercialization can help
  – It is also a sustainability path for some research software
Toolmakers Use Slicer

- SlicerCIP (Raul San Jose Estepar)-R01 HL116931, R01 HL116473
- SlicerCMF (Lucia Cevidanes, Martin Styner, Beatriz Panagua)-R01 DE024450
- SlicerProstate (Clare Tempany)-U01 CA151261, R01 CA111288, U24 CA180918, P41 EB015898
- SlicerRadiomics (Hugo Aerts)-U01 CA190234, U24 CA194354
- QICR (Ron Kikinis, Andriy Fedorov)-U24 CA180918
- SlicerGyn – Pelvic floor research (John DeLancey, U Michigan)
  P50 HD044406, R01 HD038665, P30 AG024824
- OpenIGTLink (Junichi Tokuda)-R01 EB020667
- SlicerTractography (Lauren O’Donnell)-U01 CA199459
- SlicerIGT (Gabor Fichtinger, Andras Lasso, Tamas Ungi)-Ontario Govt. funded
- SlicerRT (Csaba Pinter, Gabor Fichtinger, Greg Sharp)-Ontario Govt. funded
- SlicerDBS (Pierre Jannin)-French Govt. funded
- IASEM (Bradley Lowecamp)-NLM intramural funding
- Bender (Stephen Aylward)-AFRL
- VesselView (Stephen Aylward)-R44 CA165621
- Slicer remote rendering (Al Johnson)-P41 EB015897
- **Slicer (Ron Kikinis, Carl-Frederik Westin)-P41 EB015902**
  
  Green indicates clinical research focus
Why Apache

Free Resources and Support
- Version Control
- Web Server
- Wiki / Documentation
- Email List Servers
- Access to Software
- Legal Support

So we are golden, right?

Global Presence
Name Recognition

Core, Dedicated Group of NLP Researchers and Software Developers