

# 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 Gaudio, 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
- QIICR (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



Global Presence  
Name Recognition

## Free Resources and Support

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

So we are golden, right?



*Core, Dedicated Group*  
of  
NLP Researchers and  
Software Developers