Image-guided intervention software development for adaptive radiotherapy — using the SparKit

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Background /1
• OCAIRO: Ontario Consortium for Adaptive Interventions in Radiation Oncology
  — from 2010 to 2015
  — $7M from Ontario Research Fund (total project value $20M+)

8 institutions in Ontario:
• Toronto University Health Network (lead institution; PI: David Jaffray)
• Cancer Centre of South Eastern Ontario (CCSEO)
• London Health Sciences Centre (LHSC)
• Queen’s University (QU)
• Robarts Research Institute (RRI)
• Sunnybrook Health Sciences Centre (SHSC)
• The Ottawa Hospital Regional Cancer Centre (TOHRCC)
• University of Toronto (UT)

16 private sector partners:
• GE Healthcare
• ClaronTechnologies Inc.
• Modus Medical Devices Inc.
• CMS
• MediRecon
• NDI
• QuanserConsulting Inc.
• Ultrasonix
• RaysearchMedical Laboratories AB
• ElektaLtd., Elekta Instrument AB, Elekta Inc.
• SentinelleMedical Inc.
• IMRIS Inc.
• Philips Medical Systems Canada, Philips Electronics North America
• BestTheratronics Ltd.
• Eigen
• TomoTherapyInc.

Background /2
• OCAIRO themes:
  — Imaging and Instrumentation for Adaptive Radiation Therapy (D. Jaffray)
  — Adaptive Radiation Therapy Processes (J. Battista)
  — Validation of Image Signal and Dose Accumulation in Adaptive RT (L. John Schreiner)
  — Open Source Software Platforms and Databases for the Adaptive Process (T. Peters/G. Fichtinger)

=> Through SparKit (G. Fichtinger): funded by separate Cancer Care Ontario grants. Group of 6-8 people & infrastructure funded for 5 years, starting 2011.

Software platform and adaptive radiotherapy kit (SPARKit)

% Software Platform (SP): shared, reusable, and customizable basic software components
% Adaptive Radiotherapy Kit (ARKit): Specific toolkit for adaptive radiation therapy and associated image-guided interventions

Goals:
• Validate clinical hypotheses in clinical trials in adaptive radiotherapy
• Ready-to-use image analysis and visualization capabilities (avoid re-development)
• Quickly deployable systems (minimize system engineering effort)

SPARKit tools
Based on the NA-MIC kit (OCAIRO buy-in confirmed).

Collaboration infrastructure
**SPARKit services**

- Consult with clinical users to define SPARKit requirements
- Assist development & testing of clinical trial systems at the user’s location
- Deploy tools, provide technical support for users
- Train users using hands-on and web-based demonstrations and tutorials
- Transfer novel computing algorithms and image analysis tools into SPARKit for dissemination and sharing
- Promote SPARKit in appropriate events and conferences to clinical research community

**Some specific needs**

- DICOM-RT support in 3D Slicer
- Interface between 3D Slicer and
  - Washington University’s Computational Environment of Radiation Research (CERR) and
  - Pinnacle Treatment Planning system
- Image and protocol data sharing infrastructure

**Where are we?**

- OCAIRO articulates the need
- Funding secured
- Set up team & infrastructure
- Set up collaborations
- Identify needs
- Create & follow the plan

**Thank you.**

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