QIBA – RIC Collaboration

Providing the Radiology Research and Development Community with the Tools toward Quantitative Imaging Methods with which to Detect, Diagnose and Treat Disease

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Outline

- Need for Imaging Data Warehouse
  - Vision
- History of Committees
- Use Case Summary
- QIBA Technical Committee WG Needs
- Existing Archives
  - Limitations

Outline 2

- Possible Approaches Forward
  - Need Direction from RIC
    - Development Team
    - Support and Business Model
- Action Items

QIBA Need for Imaging Data Warehouse

- Radiology is increasingly looking toward quantitative imaging to provide evidence-based measures for the detection, diagnosis and treatment of disease.
- Development, validation & implementation of QI biomarkers depend on the quality, size, diversity, discoverability of, and accessibility to imaging databases.

Vision

- Open, growing, lasting data warehouse with images and relevant metadata including clinical outcomes, genomics
- That researchers, pharma, industry, NIH awardees could submit to and retrieve from (e.g., Craig's List); and contribute algorithms, metrics, etc.
- To accelerate development & scientific acceptance of QI methods.

History of Committees

- An ad hoc Open Image Archives (OIA) of QIBA was formed to assess what could be done to improve the creation and sustained growth of imaging archives.
- These efforts have transitioned to a combined committee of QIBA, OIA, RIC and others (CaBIG, CTSA, NCI, FDA, IHE, RadLex, Industry).

QIBA-RIC Committee

- KP Andriole, PhD
- R Avila, MS
- E. Aviles
- AJ Buckler, MS
- DA Clunie, MBBS
  BJ Erickson, MD, PhD
- R Filice, MD
- DB Goldgof, PhD
- PE Kinahan, PhD
- M McNitt-Gray, PhD
- DL Rubin, MD, MS
- EL Siegel, MD
- DC Sullivan, MD
- JT Voyvodic, PhD
- EM White, MD, MS, MBA
- G Zahlmann, PhD
- RSNA Staff (Bresolin, Carr, Drew, Koudelik, McCoy, McMillen, Miller)

History of Committees

- The QIBA-RIC Committee was formed to
  - Provide a platform of collaboration
  - Optimize synergy btwn overlapping areas of expertise and interests
  - Support and augment OIA activities
  - Draft a plan for potential RSNA involvement for imaging data warehouses going forward.

Activities to Date

- Define Use Cases
- Summarize QIBA Technical Committee WG Needs, Specifications, Uses
- Examine Existing Tools and Identify Limitations
- Discuss Possible Approaches Forward
  - Potential Role for the RSNA

Use Case Classes

A. Comparative Evaluation of Imaging Biomarker Performance vs Gold Standard

B. Public Resource Shared Data (e.g., Image Processing Algorithm Development)

C. FDA Approval of Clearance of Imaging Tests

D. Pharma Clinical Trials with Imaging Biomarkers as Endpoints.

- A and B – open, public use
- C and D – requiring restrictive security.

Use Case Classes

For two quantitative imaging biomarker projects

1. CT volumetric image analysis for management of patients with lung cancer, and
2. Quantification of tumor metabolism using FDG-PET standardized uptake value (SUV) image analysis.

Summary QIBA WG Needs

- QIBA Technical Committee Working Groups: DCE-MRI, FDG-PET, fMRI, Volumetric CT, COPD-Asthma
- Needs and Specifications
  - Image and non-image data formats beyond DICOM (eg, XML, TIFF, NiFTI)
  - Wide variety of clinical metadata
  - Data input, search, Q/R capabilities

Summary QIBA WG Needs

- Needs and Specifications
  - Image de-identification; data validation
  - Security, user authentication, group sharing
  - Application install
  - Data output statistics and analytics functions, though not image display.

Existing Archives

- TCIA (WashU), NBIA (formerly NCIA)
  - The Cancer Imaging Archive, National Biomedical Image Archive, National Cancer IA
- XNAT eXtensible Neuroimaging Archive Toolkit
- MIDAS Archive module of Kitware QI-Bench
- LONI Laboratory of NeuroImaging, UCLA
- MIRC with CTP Clinical Trials Protocol

Limitations

- Need for a "Trusted Third Party"
- Need to promote a culture of sharing, perhaps rewarding participation
- Business model for long-term sustainability
- Lack of ease-of-use of applications & tools
- Lack of easy application installation
- Difficult data upload process

Limitations

- Limited tool configurability
- Security controls and groups creation
- Ability to impact functional enhancements
- Need for front-end image and metadata collection tools
- Need for advanced searching
- Need for back-end data analytics

Need Direction from RIC

- Development Team, Implementation, Support and Business Model
- Possible Approaches
  - Open-source by Committee
  - Industry Development / Partner
  - RSNA Convener
    - RSNA Develop In-House from scratch
    - Start with one existing, generalize to others – enhance with Input Portal and Analytics Back-End

Action Items

1. Presentation of activities and possible proposed plan to RSNA RIC on 2/14/2012
2. Get direction from RIC for development, implementation and service model.
3. Write one-page proposal for presentation to the RSNA Board of Directors
   - Perform proof-of-concept implementation using QIBA WG project(s) demonstrable at 2012 RSNA Annual Meeting
4. Seek funding to support ongoing and future QIBA-RIC imaging data warehouse efforts.