Other Products

The activity continued dissemination of computational models (and data) of the knee as a resource. For more details on model sharing, please refer to progress on Resource Sharing. The activity also resulted in generation and dissemination of various documents. These include various user documentation and mature specifications for development of knee joint models. All such products are listed in the "Documents" section of the project website at https://simtk.org/home/openknee. The information is disseminated using the Creative Commons Attribution-ShareAlike 3.0 Unported (CC BY-SA 3.0) license, see http://creativecommons.org/licenses/by-sa/3.0/). This license allows anyone to share (to copy, distribute, transmit the work), to remix (to adapt the work), and to make commercial use of the work under the following conditions: i) attribution – one must attribute the work in the manner specified by the author or licensor (but not in any way that suggests that they endorse you or your use of the work); ii) share alike – if one alters, transforms, or builds upon this work, one may distribute the resulting work only under the same or similar license to this one. This licensing scheme provides utmost dissemination and promote open science. It also does not restrict any type of use, academic or commercial.

- Developer Documents (added in this budget period):
    1. Specifications: Data Management - Wiki page summarizing procedures for specimen/sample labeling and data curation, organization, and dissemination for Open Knee(s) specimens.

       http://wiki.simtk.org/openknee/Specifications/DataManagement

       Last Update: Apr 29, 2014
    2. Specifications: Anatomical Imaging - Wiki page summarizing procedures to image tibiofemoral and patellofemoral joint anatomy of Open Knee(s) specimens.

       http://wiki.simtk.org/openknee/Specifications/ExperimentationAnatomicalImaging

       Last Update: Jun 25, 2014

The team follows an open science approach; many project activities can be viewed publicly in the development wiki at http://wiki.simtk.org/openknee. All such information is disseminated using the Creative Commons Attribution-ShareAlike 3.0 Unported (CC BY-SA 3.0) license, see http://creativecommons.org/licenses/by-sa/3.0/). Significant wiki pages are listed below.

1. Specifications – Wiki page listing all specifications under development including those related to specimen preparation, anatomical imaging of the knees, mechanical testing of the tibiofemoral and patellofemoral joints, and individual tissues, and different components of modeling and simulation steps. This documentation illustrates the steps in building computational models of musculoskeletal joints. In this regard, these specifications can enable others' to implement modeling and simulation procedures and can be used for training of engineers:

   http://wiki.simtk.org/openknee/Specifications
2. Recurring Meetings – Minutes of meetings between team members and collaborators:

   http://wiki.simtk.org/openknee/RecurringMeetings
3. Specimen information – Wiki pages relevant to characteristics of acquired and tested knee specimens:
    - http://wiki.simtk.org/openknee/oks001
    - http://wiki.simtk.org/openknee/oks002
    - http://wiki.simtk.org/openknee/oks003
    - http://wiki.simtk.org/openknee/oks004
    - http://wiki.simtk.org/openknee/oks005

- http://wiki.simtk.org/openknee/oks006
- http://wiki.simtk.org/openknee/oks007

4. Specifications for activities by collaborating teams at the University of Utah and at Stanford University:

  - FEBio Features – Wiki page providing specifications for features to be implemented in FEBio, a publicly accessible software package for finite element analysis in biomechanics. Many features have been implemented, testing and dissemination are in progress.

    http://wiki.simtk.org/openknee/Specifications/FebioFeatures

  - Cloud Computing Prototype – Wiki page providing specifications to extend capabilities of Simtk.org by implementing a cloud computing prototype. A working prototype including a results retrieval interface has been built; launch is expected with the release of the upgraded SimTk infrastructure.

    http://wiki.simtk.org/openknee/Specifications/CloudComputingPrototype

5. Cases – Wiki page providing a list of case studies (under development or published) to illustrate the utility of Open Knee(s) models & data.

   http://wiki.simtk.org/openknee/Cases

6. KneeProjects – Wiki page listing various projects providing knee related models and data that may be of use for Open Knee(s) users and for anyone who may be interested in modeling and simulation of the knee joint.

   http://wiki.simtk.org/openknee/KneeProjects

Editorial articles published in the report period related to Open Knee(s) are:

- Erdemir, A. And Jones, M. (2015) Open Knee(s) project: using crowdsourcing to harness community insight and clinical expertise to revolutionize knee modeling, Orthopaedic Insights (Winter 2014-2015), A Physician Newsletter from the Department of Orthopaedic Surgery, Cleveland Clinic.

Peer-reviewed conference abstracts presented during the report period are:

- Maas, S. A., Erdemir, A., Halloran, J. P. and Weiss, J. A. Computational framework for application of residual stress when the stress-free configuration is unknown, 12th International Symposium on Computer Methods in Biomechanics and Biomedical Engineering, October 13-15, 2014, Amsterdam, The Netherlands.
- Erdemir, A. Bringing finite element analysis of biological structures to the masses by extending simulation software with open access models, 7th World Congress of Biomechanics, July 6-11, 2014, Boston, MA.
- Bonner, T. F., Halloran, J. P., Erdemir, A. and Colbrunn, R. W. Pathway to quantify the effects of peripheral soft-tissue and capsule on knee joint response, 7th World Congress of Biomechanics, July 6-11, 2014, Boston, MA.