**2018 IMAG Futures Meeting – Moving Forward with the MSM Consortium (March 21-22, 2018)**

*Pre-Meeting Abstract Submission Form*

*\*Please submit to the NIBIB IMAG mailbox (*[NIBIBimag@mail.nih.gov](mailto:NIBIBimag@mail.nih.gov)*) by* ***January 8th, 2018***

*\*Save your abstract as “MSM PI Last Name \_ 2018 IMAG Futures Pre-Meeting Abstract”*

**PI(s) of MSM U01: Jeffrey W Holmes**

**Institution(s): University of Virginia**

**MSM U01 Grant Number: U01HL127654**

**Title of Grant:** Multiscale Models of Cardiac Growth, Remodeling, and Myocardial Infarction

**Abstract**

Which MSM challenges are you addressing from the IMAG 2009 Report and how?

<https://www.imagwiki.nibib.nih.gov/content/2009-imag-futures-report-challenges>

(indicate which challenge (#) you’re addressing)

*You may insert images by copying and pasting below*

#4 – fusing cell-level models of wound healing and growth with organ-level models of heart mechanics and systems-level models of the circulatory system.

#15 – understanding the mechanisms of action of cardiac resynchronization therapy (CRT), a treatment for heart failure.

#17 – developing predictive models that can be used to optimize CRT in individual patients.

Are you using machine learning and or causal inference methods and how?

*You may insert images by copying and pasting below*

No.

Please briefly describe significant MSM achievements made (or expected).

*You may insert images by copying and pasting below*

The most important achievement to date is developing a flexible framework to couple agent-based models with finite-element models that allows users to vary the spatial resolution of each coupled model independently. Although this is a pretty specific technical development, it is absolutely essential for any investigator who wants to capture cell-level ABMs and tissue-level FEMs of any tissue or organ.

Please suggest any new MSM challenges that should be addressed by the MSM Consortium moving forward.

*You may insert images by copying and pasting below*

I would like to see the MSM consortium begin to think about how to educate students (and PIs) in multi-scale modeling. Is everything we do specific to the individual problems and modeling frameworks, or are there some common principles we could start to abstract, articulate, and teach?

What expertise are on your team (e.g. engineering, math, statistics, computer science, clinical, industry) and who?

*Please list as “Expertise – Name, email”*

Biomechanics and Cardiovascular Physiology – Jeff Holmes (PI), holmes@virginia,edu; Biomechanics and Cardiovascular Physiology – Jeff Omens (subcontract PI at UCSD), jomens@ucsd.edu; Biomechanics, Cardiovascular Physiology, and Finite-Element Modeling – Andrew McCulloch, amcculloch@eng.ucsd.edu; Cardiovascular Physiology and Agent-Based Modeling – Shayn Peirce-Cottler, smp6p@virginia.edu; Biomechanics and Finite-Element Modeling – Kyoko Yoshida, ky2p@virginia.edu; Clinical Cardiology/Electrophysiology – Ken Bilchick, KCB7F@hscmail.mcc.virginia.edu

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