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PAR-15-085
FUNDING OPPORTUNITY ANNOUNCEMENT
Information to Applicants

ARO ONR

Tips to Applicants

- Identify the Cutting Edge Challenge(s) you are addressing through your proposed project (see next 3 slides)
- Describe the research being proposed for that Cutting Edge Challenge
- Form highly interactive partnerships that strongly integrate truly diverse expertise
  - Written in research plan section of application, or in the biosketches or budget justification
- Read Section IV requirements very carefully!!

http://grants.nih.gov/grants/guide/pa-files/PAR-15-085.html

Cutting Edge Challenges (1)

- Next-generation multiscale models that integrate between different scientific fields (e.g. cardiovascular and neuroscience) and predict integrated functions
- Higher level models and modeling approaches that integrate multiple physiological (and possibly psychological) systems in order to better understand the human response (e.g. to extended space flight, and other unique environments)
- Novel methods to fuse data-rich and data-poor scales to enable predictive modeling
- Novel methods to fuse biological and/or behavioral processes and mechanisms to model outcomes as a result of various interventions
- Reproducible and reusable multiscale models that will be integrated and adopted into model-poor fields (e.g. tissue engineering, regenerative medicine, drug and gene delivery, preventive interventions)
- Multiscale models strongly coupled with standardized protocols for model-driven data collection

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Cutting Edge Challenges (2)

- Implementing virtual clinical trials with multiscale models to predict outcomes
- Problem-driven multiscale models that require high performance computing
- Model predictions that drive a community of experimentalists towards systematic testing and validation
- Predictive multiscale models that strongly incorporate uncertainty quantification
- Mechanistic multiscale models that bridge to the population level to capture more clinical and biological realism for the population
- Models that generate testable hypotheses regarding the biological underpinnings of behavioral and social phenomena and processes at the individual and population level
- Models that describe mechanisms through which "outside-the-skin" factors, such as behavioral stressors, social bonding, parenting behavior, etc., can lead to "inside-the-skin" changes, such as in gene expression, the microbiome, or other factors that affect health or behavior

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Cutting Edge Challenges (3)

- Models that provide innovative characterizations of interactions between individual-level behaviors, cognition, or affective processes and group-, market-, or population-level outcomes
- Models to explore underlying mechanisms of individual-, community-, or population-level preventive or therapeutic interventions
- Novel computational modeling approaches for big data that account for simultaneous sources of data on multiple scales; from biological and physiological measures, to social and psychological variables, and to environmental or contextual or societal level factors
- Multiscale models that characterize the implications of individual-level risks for collective outcomes, or the implications of systemic risks for individual behaviors and outcomes
- Predictive multiscale models to improve clinical workflow, standard operating procedures, patient-specific modeling for diagnosis and therapy planning

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PAR-15-085 Contacts

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OBSSR – Bill Riley

ARO – Virginia Pasour
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FDA – Donna Lochner
NSF – Tom Russell
NSF (CISE) – Dan Katz
NSF (ENG) – Athanassios Sambanis
NSF (Math) – Mary Ann Horn
NASA – Mark Shelhamer
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Common Review Concerns

- **Not clear how this model is multiscale (!)**
  - How will they link/integrate data between scales?
  - Are they really only using single-scale models to address the problem?
  - Is a multiscale model needed to address this question?
  - Not clear this is the right method to use
- **Not clear how this model will be predictive**
  - What are they going to do with the model?
  - What are the new hypotheses that might be generated?
  - A shame that they didn't extend their predictions to other interesting questions related to the application areas.
- **Not clear on the modeling methodology**
  - Forcing the use of a method without really addressing question
  - Uncritical of their own methodology, what are the limitations (how will they address them), pitfalls, alternative approaches?
  - Cutting edge/new method with little preliminary data to show it will work
  - How are they calculating x, y, z, etc.

Presented to reviewers during reviewer orientation

PROGRAMMATIC ISSUES OF PAR-15-085

Model Requirements

- Compelling Multiscale Problem: identified by one of the breakthrough challenge bullets
  - For both new and existing models
- Multiscale: model crosses at least two scales and at least one linkage between scales
- Mechanistic: substantial representations of the underlying biological or behavioral mechanisms and processes
- Predictive: convincing technical plan (approach) for achieving predictive outcomes from the proposed multiscale model
- Data: identified and appropriately justified for each scale and link modeled.
- **Architecture:** which will facilitate future model sharing

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Specific Topics of Interest

(bullets from Section I)

http://grants.nih.gov/grants/guide/pa-files/PAR-15-085.html

- Written to stimulate new ideas, and new unique methods to pursue a multiscale problem
- Bullets are pushing very difficult challenges

- Have the investigators taken up one of these challenges, or something similarly challenging?
- If the investigators are expanding an existing model, are they using the existing model to address these challenges?

Proposal Requirements

- MSM Consortium Plan
  - Funded mandate to pursue activities for the community
- Model Credibility Plan
  - Strategies and metrics for evaluating the credibility of the proposed multiscale model(s) to address the question(s) of interest within the intended domain of application in biomedical, biological, behavioral, environmental or clinical research
  - 3rd party evaluation
  - Intention is to move towards model sharing and reuse in the community
- Broader Impacts statement
  - The advancement of scientific knowledge and activities that contribute to achievement of societally relevant outcomes (e.g. diversity, STEM education)
- Data Management Plan
  - Description of data types, standards metadata, policies for reuse, plans for archiving

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Interagency U01

- NOT a "typical" U, U01, or NIH Cooperative Agreement you might have seen before
  - Please wipe out any pre-assumptions!

- THIS Cooperative Agreement
  - Negotiated milestones, timeline, MSM plan, Model Credibility plan, *prior to award* – utilizing reviewer comments/recommendation
  - PI/investigative team works *cooperatively* with program officers
    - "fixable flaws" are monitored with IMAG oversight

REMEMBER: "fixable flaws" do not need further peer review (scores should reflect this)

Model Credibility Plan

- Is the Model Credibility Plan feasible and appropriate for this project?
- To what degree will the proposed credibility assessment methods and metrics establish confidence in the model's predictive capabilities for the intended domain of use?
- Are the proposed timeline and budget appropriate for model evaluation by a third party?

NOTE: Investigators should take this opportunity to propose (and allocate funds for) 3rd party evaluation of the credibility of the proposed model under development to address the question(s) of interest within the intended domain of application in biomedical, biological, behavioral, environmental or clinical research. Do not list names of 3rd party evaluators. The program officer and science officers will work with the PI to determine the appropriate 3rd party evaluators during the funding period.

MSM Consortium Plan

- Is the MSM Consortium Plan feasible and appropriate for this project?
- Have the investigators devoted an adequate amount of personnel and effort to contribute meaningfully to the MSM Consortium?
- Are the milestones, timeline and budget appropriate for active participation within the MSM consortium?
- Will the activities and efforts proposed in the plan contribute to the greater multiscale modeling community?
- Have the investigators proposed co-leading an existing MSM Working Group, or proposed new Working Groups to co-lead?

NOTE: Investigators should take this opportunity to propose (and allocate funds for) addressing unmet needs or challenges of a field through a community driven environment. All PI's are expected to begin co-leading a Working Group within the time period of their award, for at least 2 years.

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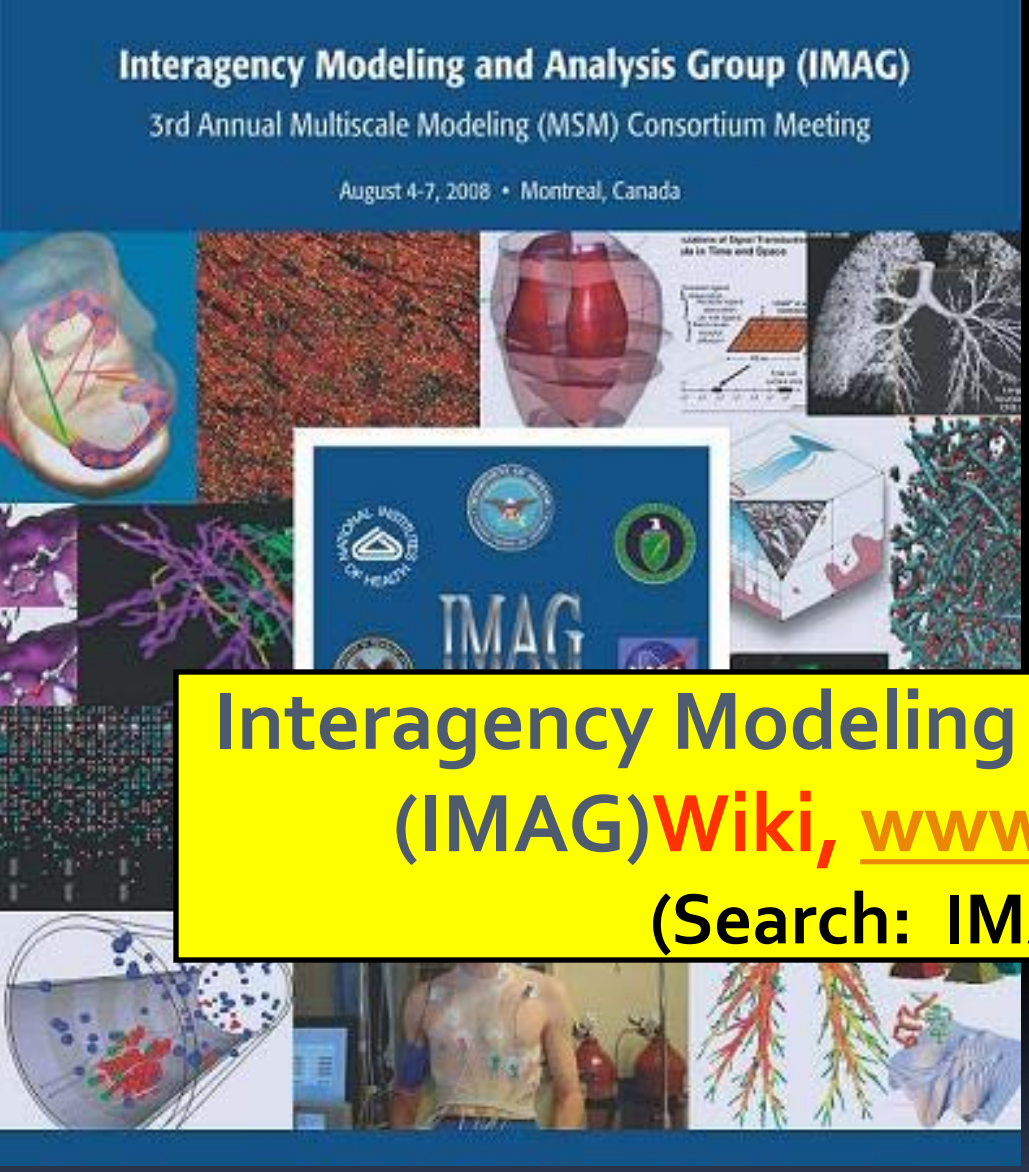
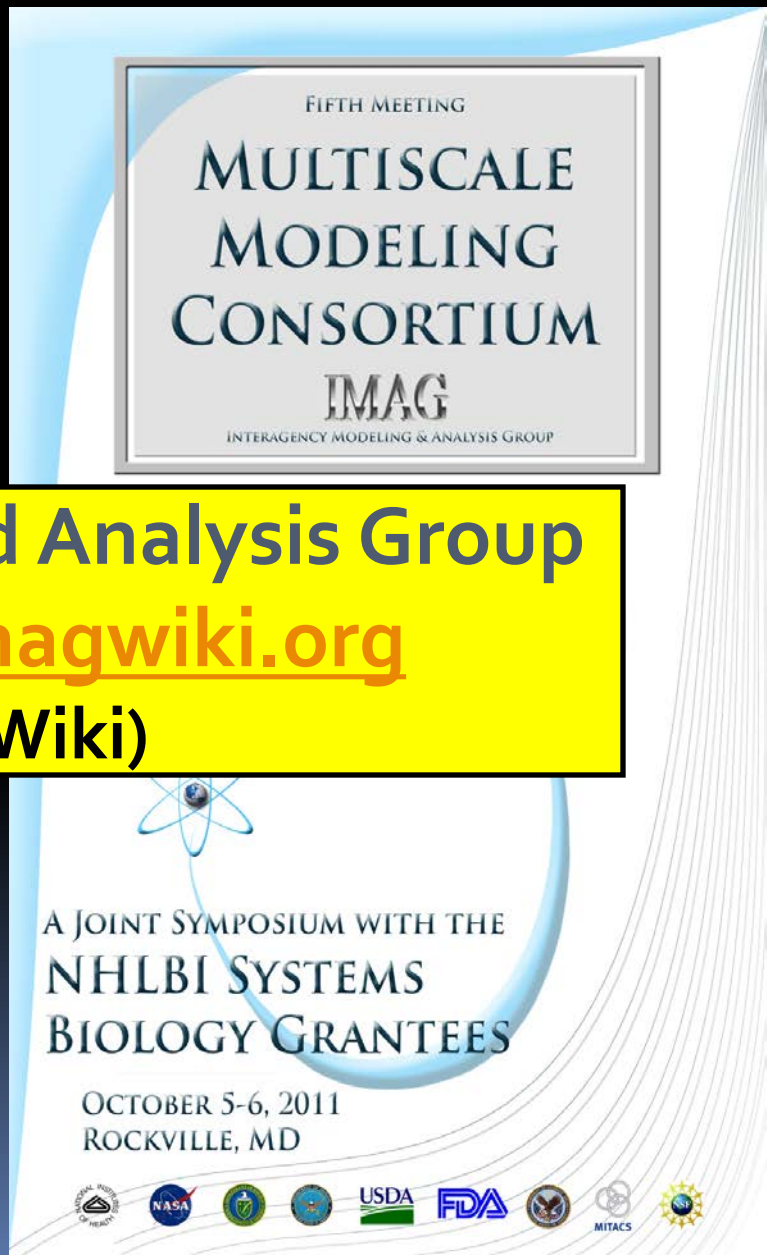
Interagency Modeling and Analysis Group

United States Department of Agriculture

National Institute of Food and Agriculture





Interagency Modeling and Analysis Group (IMAG)Wiki, www.imagwiki.org

(Search: IMAG Wiki)

MULTISCALE MODELING CONSORTIUM IMAG

The MSM Consortium provides opportunities to:

- converse with program officers from 10 government agencies, IMAG Participants, from the United States and Canada
- network with other MSM investigators, MSM Participants and Projects
- participate in Working Group discussions on the wiki
- participate in virtual scientific presentations by all Working Groups throughout the year
- participate in annual meetings of the MSM Consortium, IMAG/MSM Events
- learn about the latest modeling and MSM related activities from around the world, Multiscale Modeling of the Physiome - Projects Around the World
- access various Resources for Modeling

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2015 MSM Working Groups

- Multiscale Systems Biology Working Group
- Biomechanics Working Group
- Theoretical and Computational Methods
- Model and Data Sharing Working Group
- High Performance Computing Working Group
- Clinical and Translational Issues Working Group
- Computational Neuroscience Working Group
- Population Modeling Working Group
- Cell-to-Macroscale Working Group
- Integrated multiscale biomaterials experiment and modeling group (ImuBEAM)
- Committee on Credible Practice of Modeling & Simulation in Healthcare Description

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