

# *THE STRUCTURE & FUNCTION OF THE INTERAGENCY MODELING AND ANALYSIS GROUP*

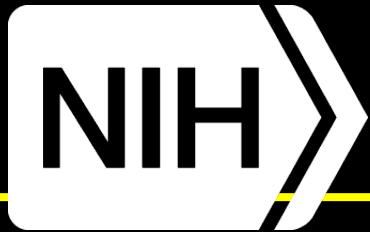
**IMAG** *AND THE*

MULTISCALE  
MODELING  
CONSORTIUM

Grace C.Y. Peng, Ph.D.  
MSM Viral Pandemics WG  
January 14, 2021  
virtual



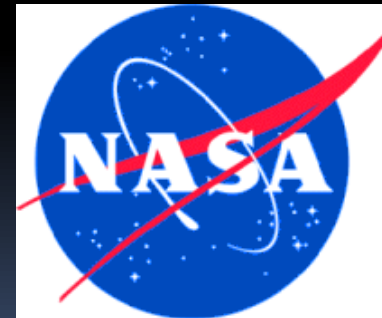
National Institute of  
Biomedical Imaging  
and Bioengineering



# IMAG



## Interagency Modeling and Analysis Group



Greater than the sum of its parts

The logo features the word "IMAG" in a large, 3D, metallic-style font. Behind the letters is a large, teal-colored circular arrow that curves around a central black circle, indicating a continuous cycle or process.

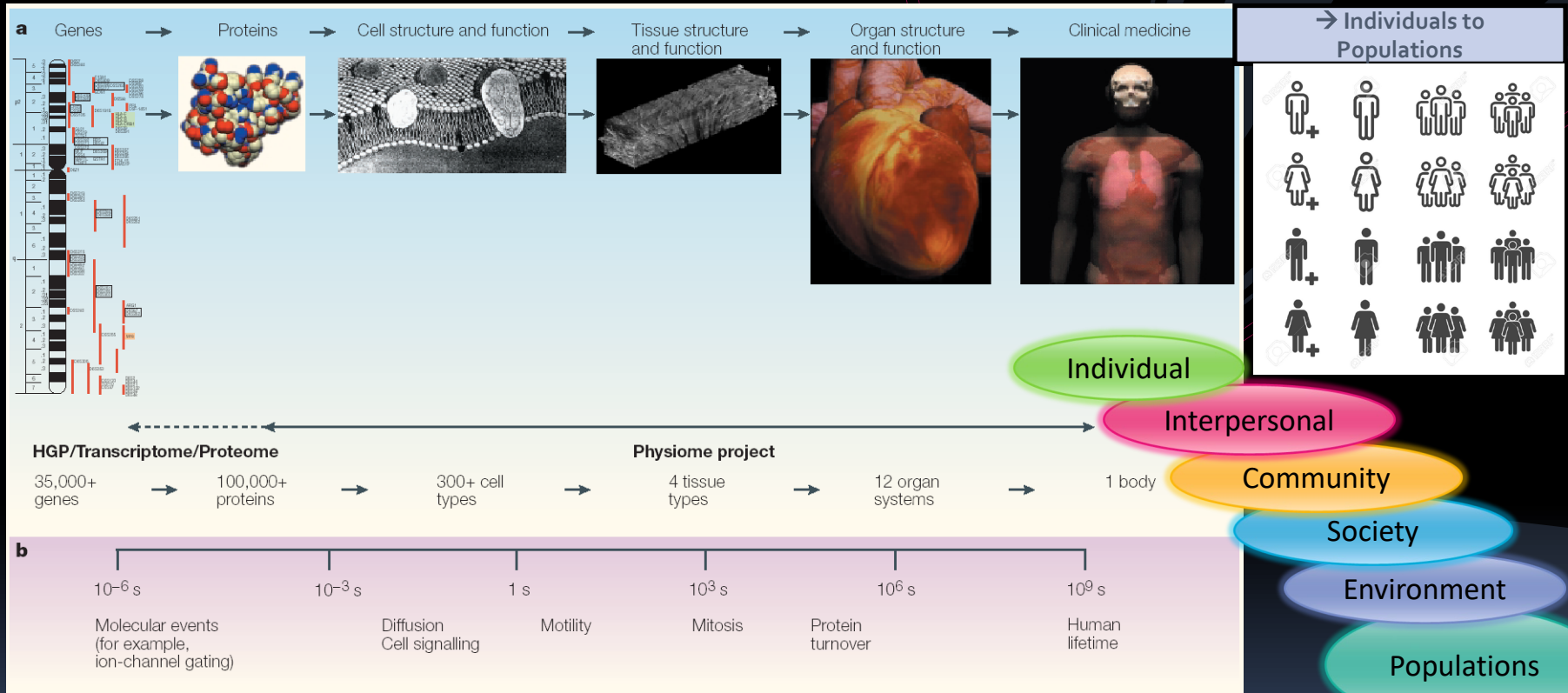
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Interagency Modeling and Analysis Group  
(IMAG) [Wiki](#)  
(Search: IMAG Wiki)

# Multiscale Modeling

→ Biomedical, Biological & Behavioral Systems



Hunter and Borg, Nature 2003

Social-Ecological Systems

# MSM Task Forces

## Methodologies

- Cell-to-Macroscale Working Group
- High Performance Computing Working Group
- Multiscale Systems Biology Working Group
- Theoretical and Computational Methods
- Population Modeling Working Group

## Basic Science Applications

- Biomechanics Working Group
- Computational Neuroscience Working Group
- Integrated multiscale biomaterials experiment and modeling group (ImuBEAM)

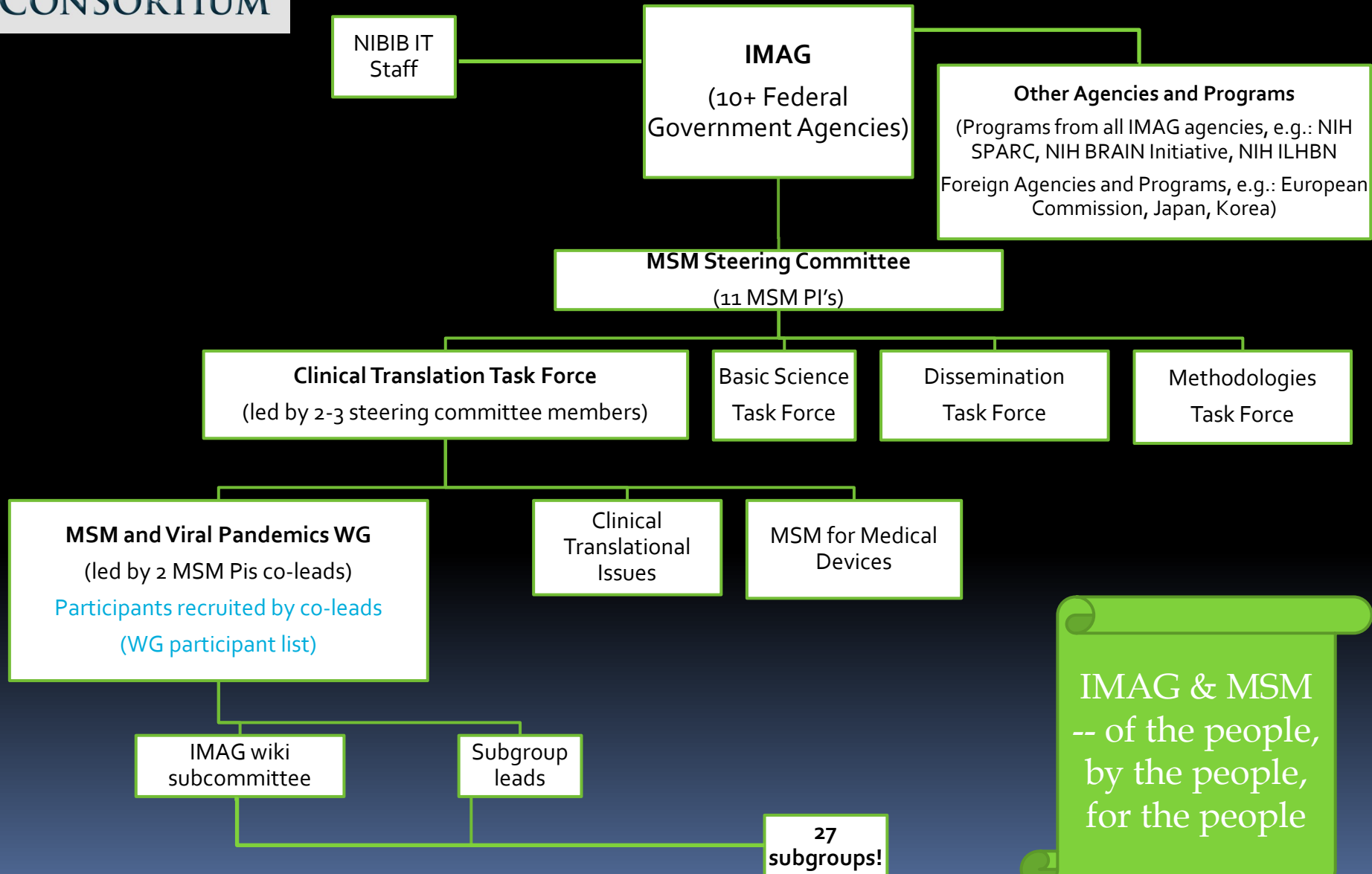
## Dissemination

- Committee on Credible Practice of Modeling & Simulation in Healthcare Description
- Model and Data Sharing Working Group
- Public Dissemination and Education

## Clinical Translation

- Clinical and Translational Issues
- Multiscale Modeling and Viral Pandemics
- MSM for Medical Devices

# Organizational Chart



IMAG & MSM  
-- of the people,  
by the people,  
for the people

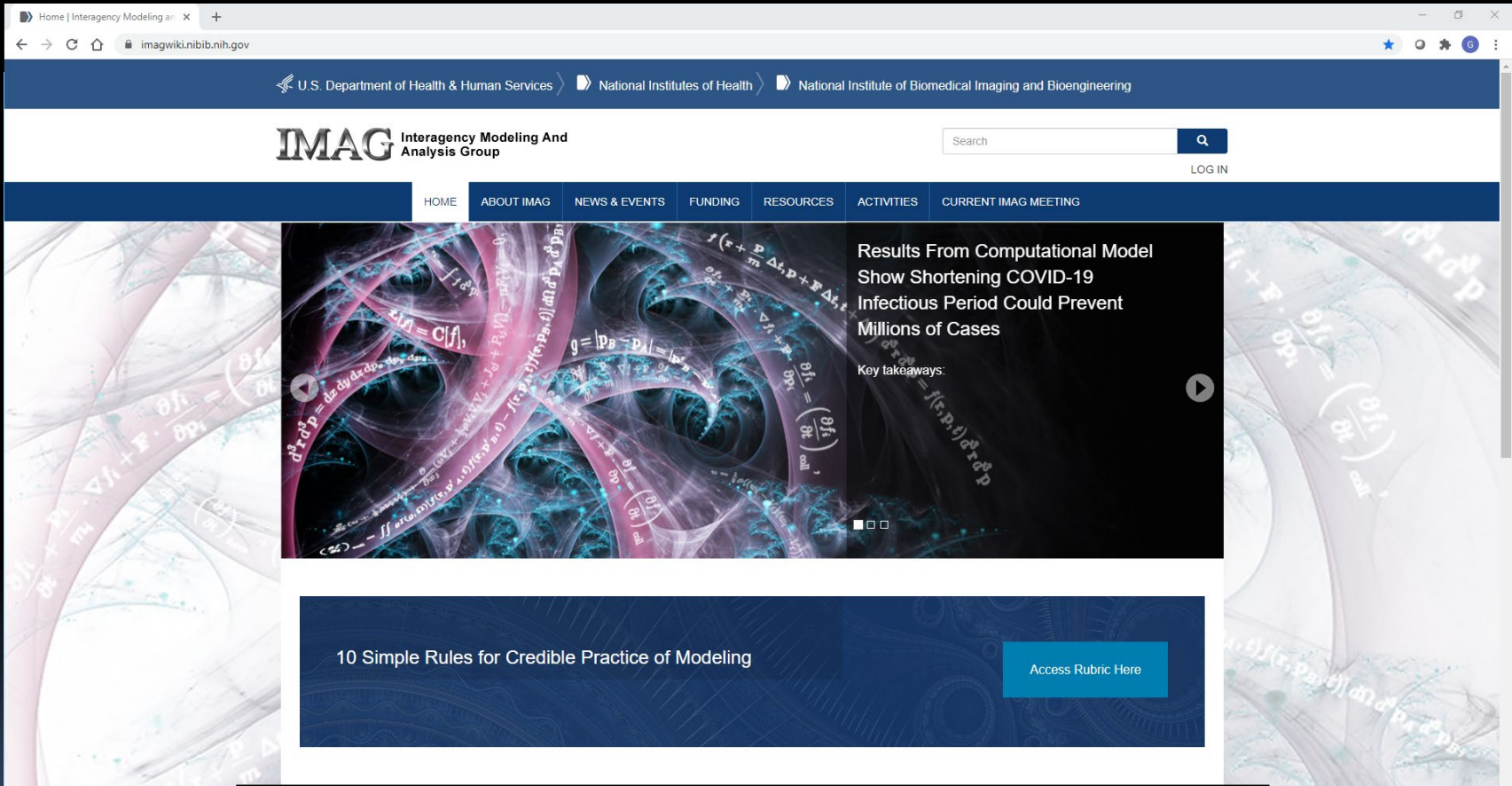


# Events

- 2003 - Created
- 2004 - Interagency Solicitation for Multiscale Modeling in Biomedical, Biological and Behavioral Systems (NIH, NSF, NASA, DOE)
- 2006 – Formation of the MSM Consortium
- 2007 - Predictive Multiscale Models of the Physiome in Health and Disease (R01)
- 2009 – IMAG Futures Meeting
- 2011 & 2015 - Predictive Multiscale Models for Biomedical, Biological , Behavioral, Environmental and Clinical Systems (Interagency U01)
- 2017 – Celebrated MSM 10<sup>th</sup> Anniversary (10 years of consortium meetings)
- 2018 – IMAG Futures Meeting – revisiting 2009 recommendations
- 2019 – MSM Consortium Meeting – Translation and Dissemination
- 2019 – Integrating ML with MSM for Biomedical, Biological and Behavioral Systems (2019 ML-MSM)
- 2020 – Amplifying Impact by Nurturing Diversity (IMAG-AND Futures)



# The IMAG wiki



The screenshot shows the homepage of the IMAG wiki. The browser address bar displays "imagwiki.nibib.nih.gov". The header includes the U.S. Department of Health & Human Services, National Institutes of Health, and National Institute of Biomedical Imaging and Bioengineering. The IMAG logo is prominently displayed, followed by the text "Interagency Modeling And Analysis Group". A search bar and a "LOG IN" link are located to the right. A navigation menu contains links for HOME, ABOUT IMAG, NEWS & EVENTS, FUNDING, RESOURCES, ACTIVITIES, and CURRENT IMAG MEETING. The main content area features a large video player with a thumbnail showing mathematical equations and a play button. To the right of the video, the text reads: "Results From Computational Model Show Shortening COVID-19 Infectious Period Could Prevent Millions of Cases". Below this, it says "Key takeaways:". At the bottom of the page, there is a blue banner with the text "10 Simple Rules for Credible Practice of Modeling" and a button labeled "Access Rubric Here".

U.S. Department of Health & Human Services > National Institutes of Health > National Institute of Biomedical Imaging and Bioengineering

**IMAG** Interagency Modeling And Analysis Group

Search

LOG IN

HOME ABOUT IMAG NEWS & EVENTS FUNDING RESOURCES ACTIVITIES CURRENT IMAG MEETING

Results From Computational Model Show Shortening COVID-19 Infectious Period Could Prevent Millions of Cases

Key takeaways:

10 Simple Rules for Credible Practice of Modeling

[Access Rubric Here](#)

Interagency Modeling and Analysis Group  
(IMAG) [Wiki](#)  
(Search: IMAG Wiki)



NIH

# Multiscale Modeling



A stage setup featuring six spotlights mounted on a truss at the top, casting light onto a circular platform below. The word "Highlights" is centered in the air above the platform.

Highlights

# MODEL STANDARDS & SHARING

MODEL SHARING

MODEL  
DATA SHARING  
**REPRODUCIBILITY**

MODEL & DATA SHARING

STANDARDS



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# Credible Practice of Modeling & Simulation in Healthcare

CFMS

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## Contents

1. Ten Simple Rules of C
1. Committee Perspe
2. Community Persp

## Ten Not So Simple Rules for Model Credibility

1. Define context clearly
2. Use appropriate data
3. Evaluate within context
4. List limitations explicitly .
5. Use version control
6. Document adequately
7. Disseminate broadly
8. Conduct independent reviews
9. Test competing implementations
10. Conform to standards

## Just published after 8 years!!

Erdemir, A., Mulugeta, L., Ku, J.P. *et al.* Credible practice of modeling and simulation in healthcare: ten rules from a multidisciplinary perspective. *J Transl Med* 18, 369 (2020).  
<https://doi.org/10.1186/s12967-020-02540-4>

## Ten Sim

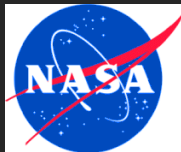
## practice

One of the first tasks of the ...ing & simulation in healthcare. This activity started as a Commi ... generating a list of ten key elements or simple rules of credible practice (Committee Perspective). As the Committee discussions finalized, the group agreed on the necessity to reach out to the broader population of stake holders. In result, the Committee launched a public survey to establish the



Now Applied to COVID-19

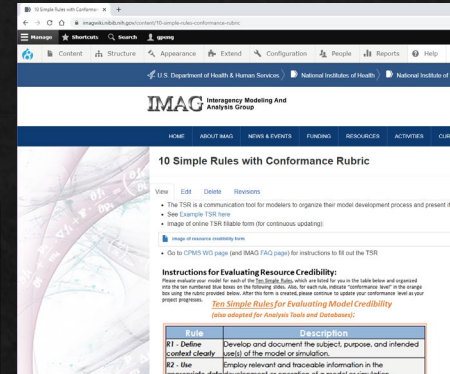
MULTISCALE  
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## Ten Simple Rules for Model Credibility

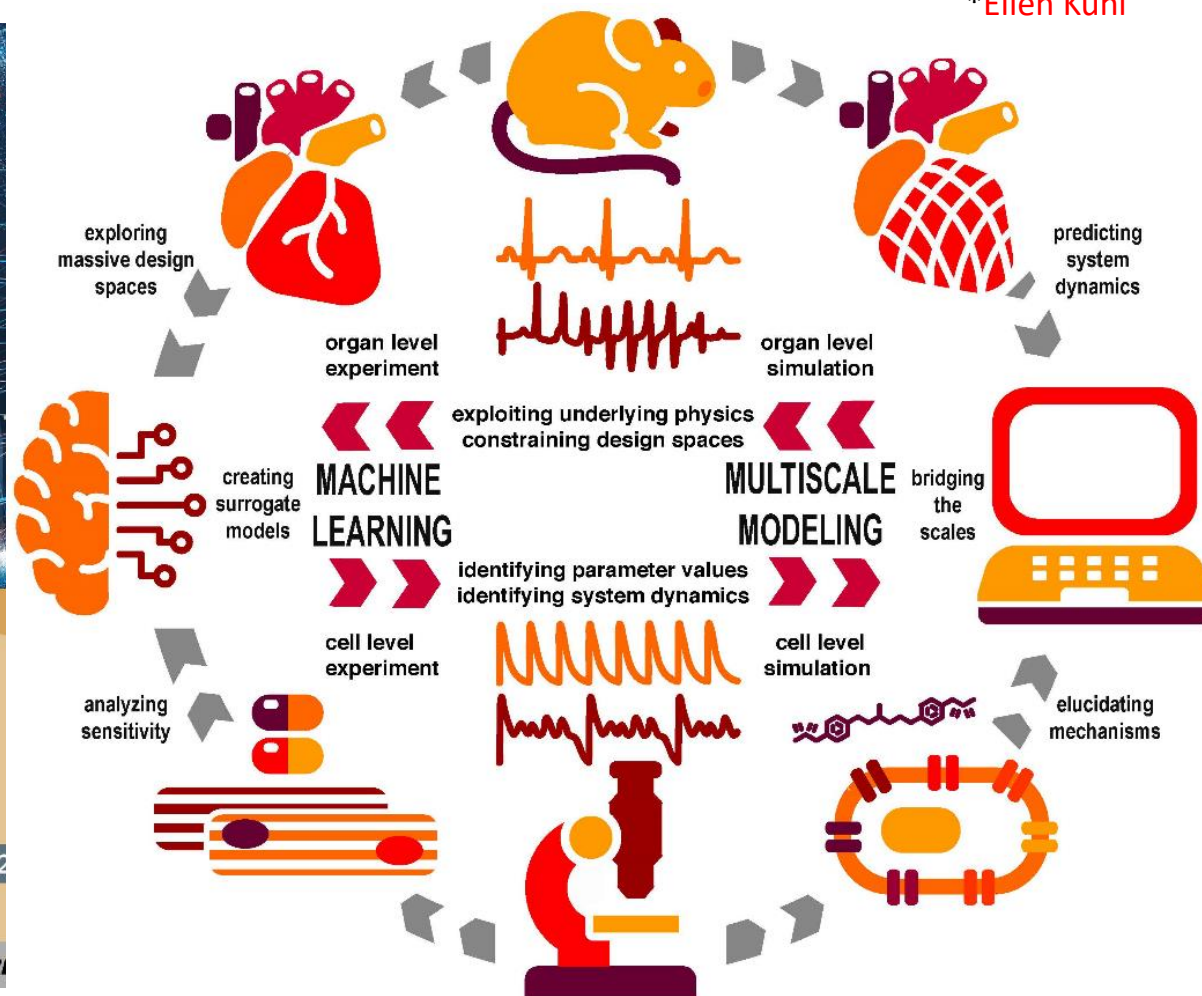
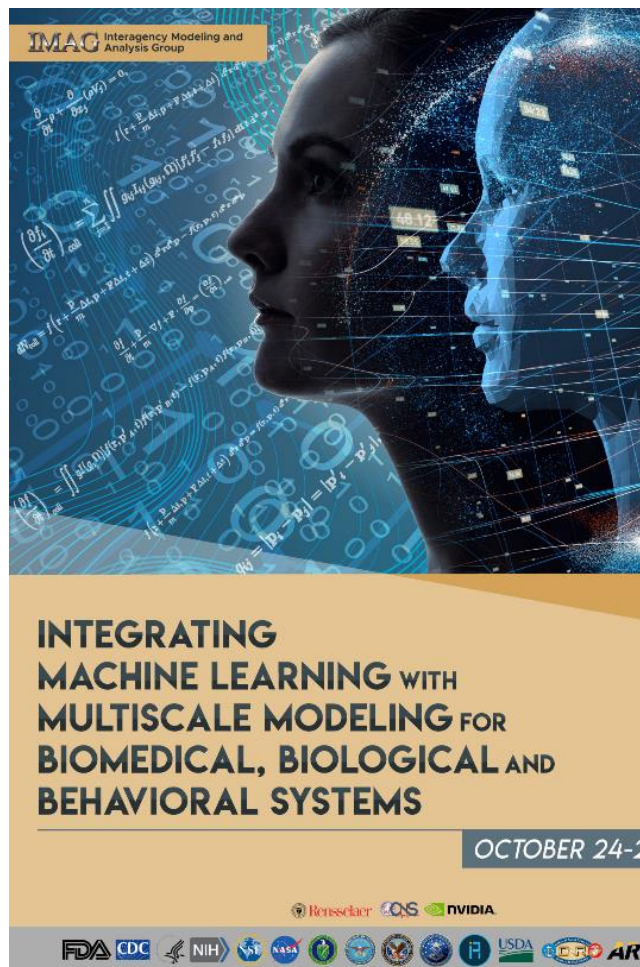
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And



\*Ellen Kuhl



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# How did this all start?

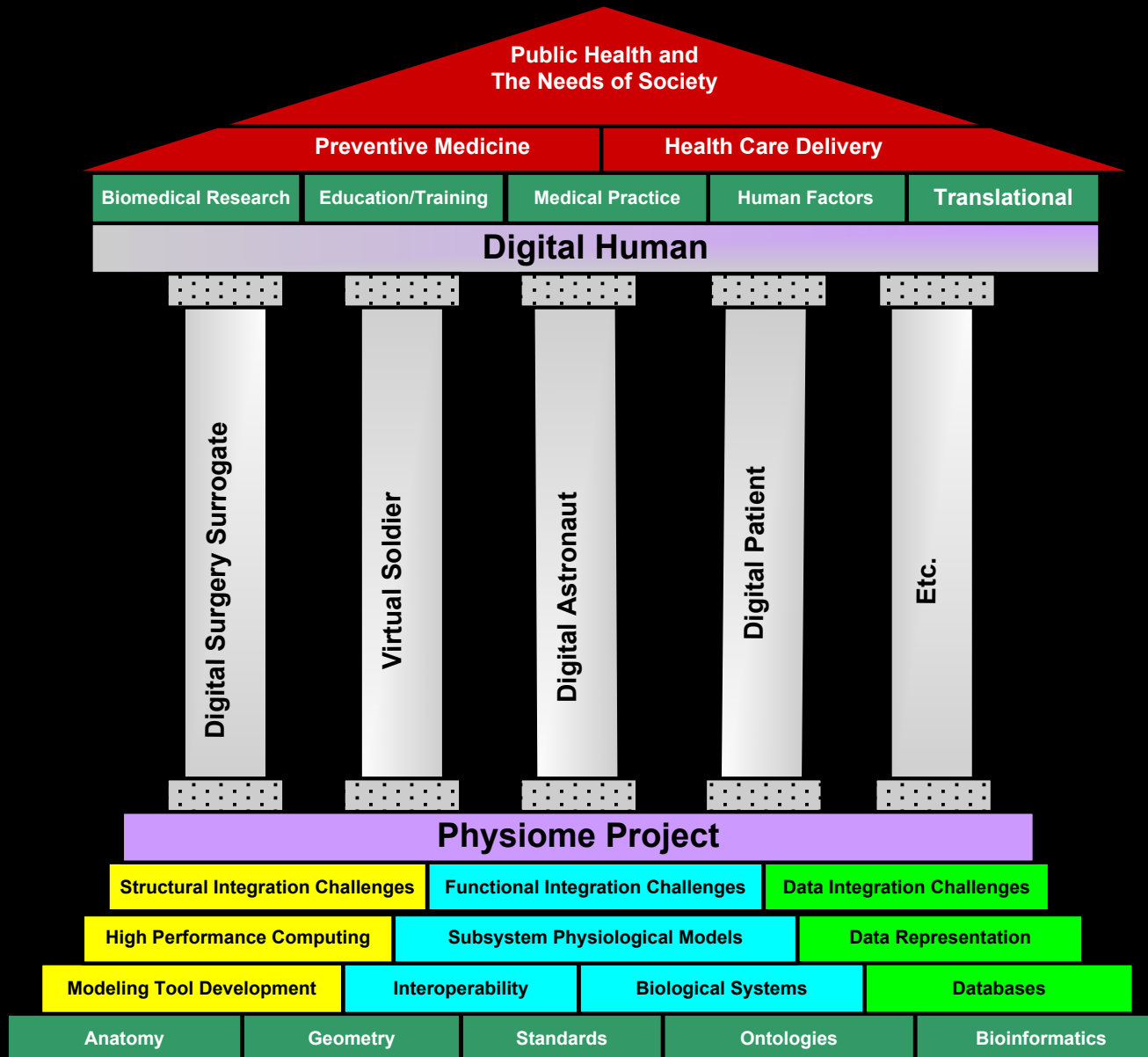


# NIH & IMAG Milestones

- 1999, NIH BISTI Report (Biomedical Information Technology Initiative)
- 2000 BISTIC formed - BISTI Initiatives
- 2003 Inaugural BISTIC Symposium – Multiscale Modeling
- 2005 and 2006, NIH Roadmap NCBC funded (National Centers for Biocomputing)
- 2000, NIBIB formed
- 2003, IMAG formed (Interagency Modeling and Analysis Group)
- 2004, IMAG Interagency Funding Opportunity for Multiscale Modeling (MSM)
- 2005, IMAG MSM Consortium formed
- 2007, IMAG New Funding Opportunity for the Physioime

ARCHIVES

# The Present is Creating the Future



*Courtesy of Ron White*

# Reflections



- Integrate concurrent events
- Entertain all ideas – even the craziest!
- Crowdsource/refine – gather, share, interact (repeat)
- Recruit partners – discuss cost/benefits
- Delegate responsibilities – share ownership
- Evolve & understand mutually shared goals
- Communicate, communicate, communicate
- Document, organize, archive
- Make it fun!

WG co-leads should devise rotating leadership plans, utilize a steering committee as needed

# Many thanks to all the IMAG & MSM participants since 2003!



IMAG participants

- <https://www.imagwiki.nibib.nih.gov/content/listing-imag-participants>

MSM participants

- <https://www.imagwiki.nibib.nih.gov/content/msm-participants>



# Thank You!

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