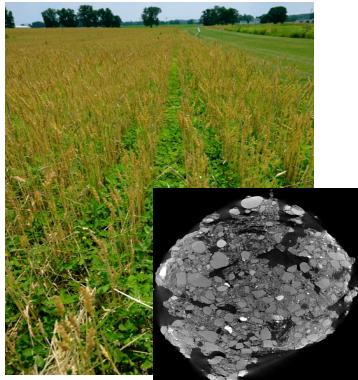


Do More, Faster: Utilizing Advanced Computational Resources in Your Research Team

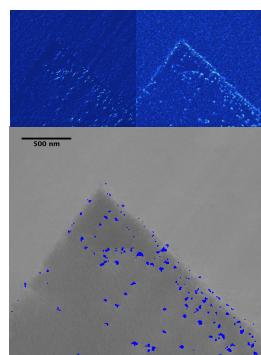
Dr. Dirk Colbry
Director of HPC
Studies
Department of
Computational
Mathematics Science
and Engineering

SciTS 2019, Michigan State University

Some of My Research



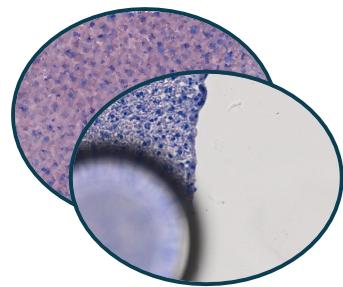
Soil carbon capture for crop yield analysis and climate change research



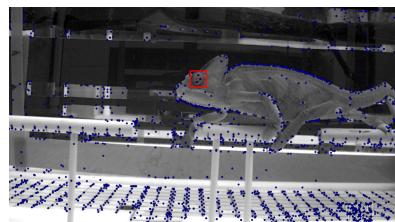
Building 3D crystalline structure of metals using ECCI and FIB technologies



Multi-channel data fusion: fMRI, EEG and 2.5D surface scanning



Large scale automated histopathology putting the researcher in the loop



Incremental machine learning for exploratory science

Using Computers to Do Science

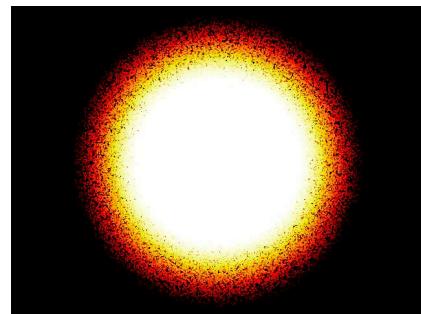
2005-present High Performance Computing Center User

2009-2014 HPCC Computational Consultant

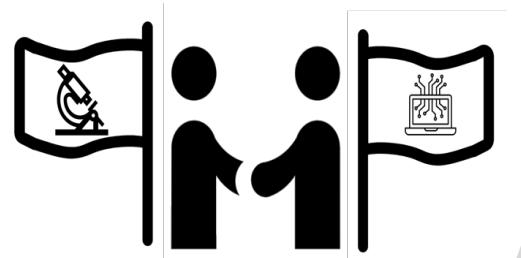
2013-2014 XSEDE Campus Champion Leadership team

2014-2015 Director of HPCC

2015-present Director of HPC Studies, CMSE

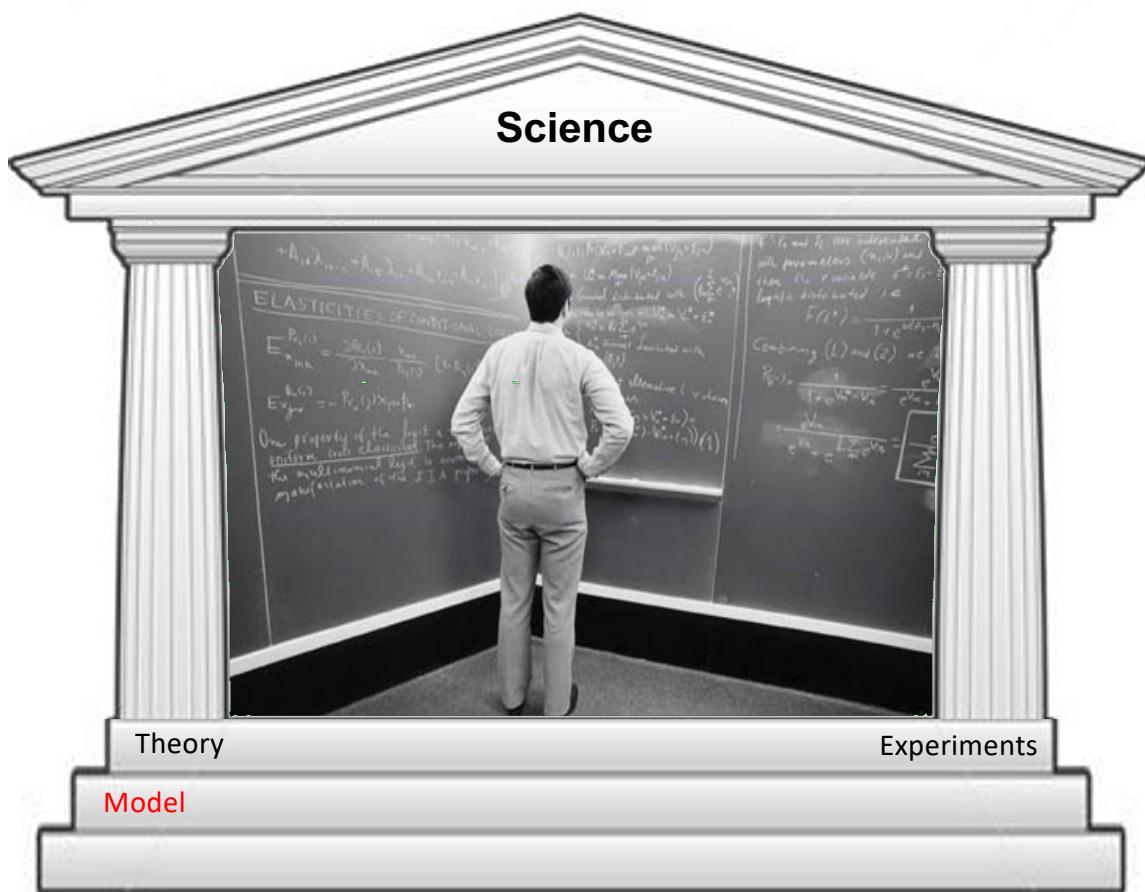
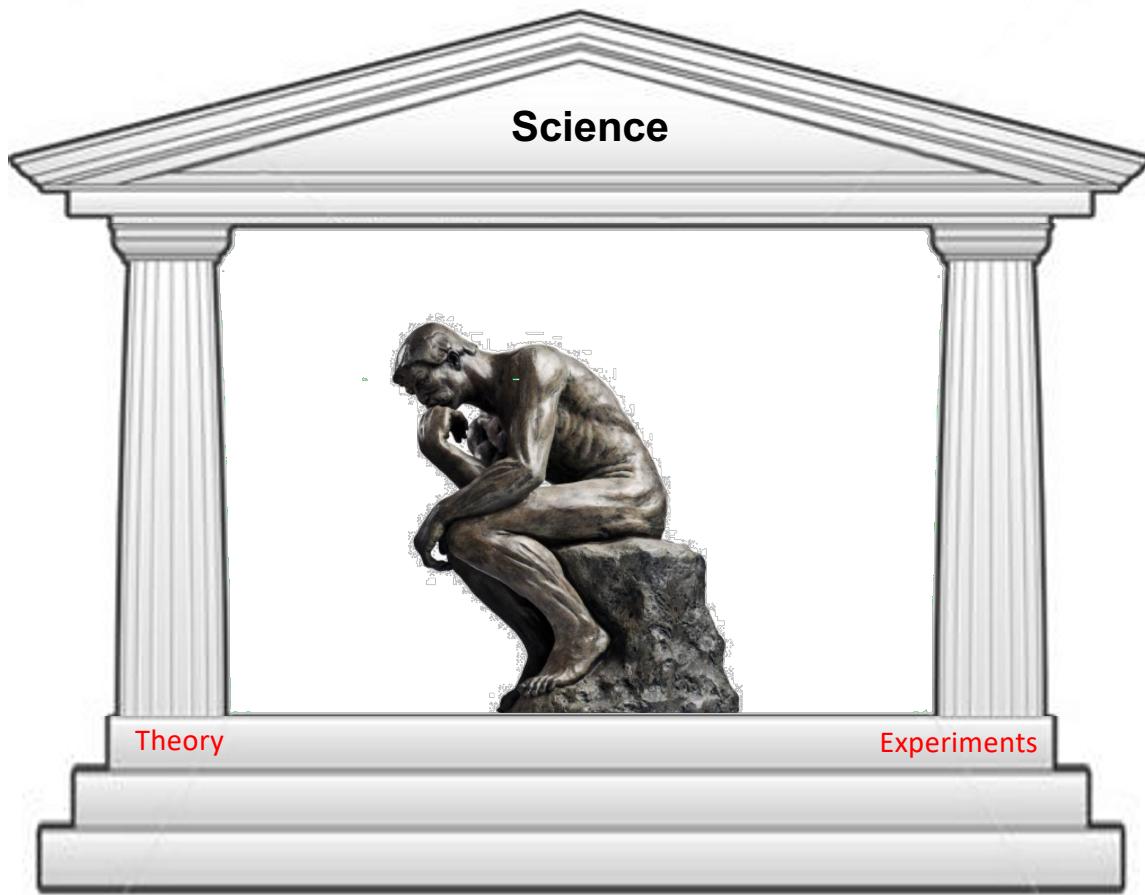


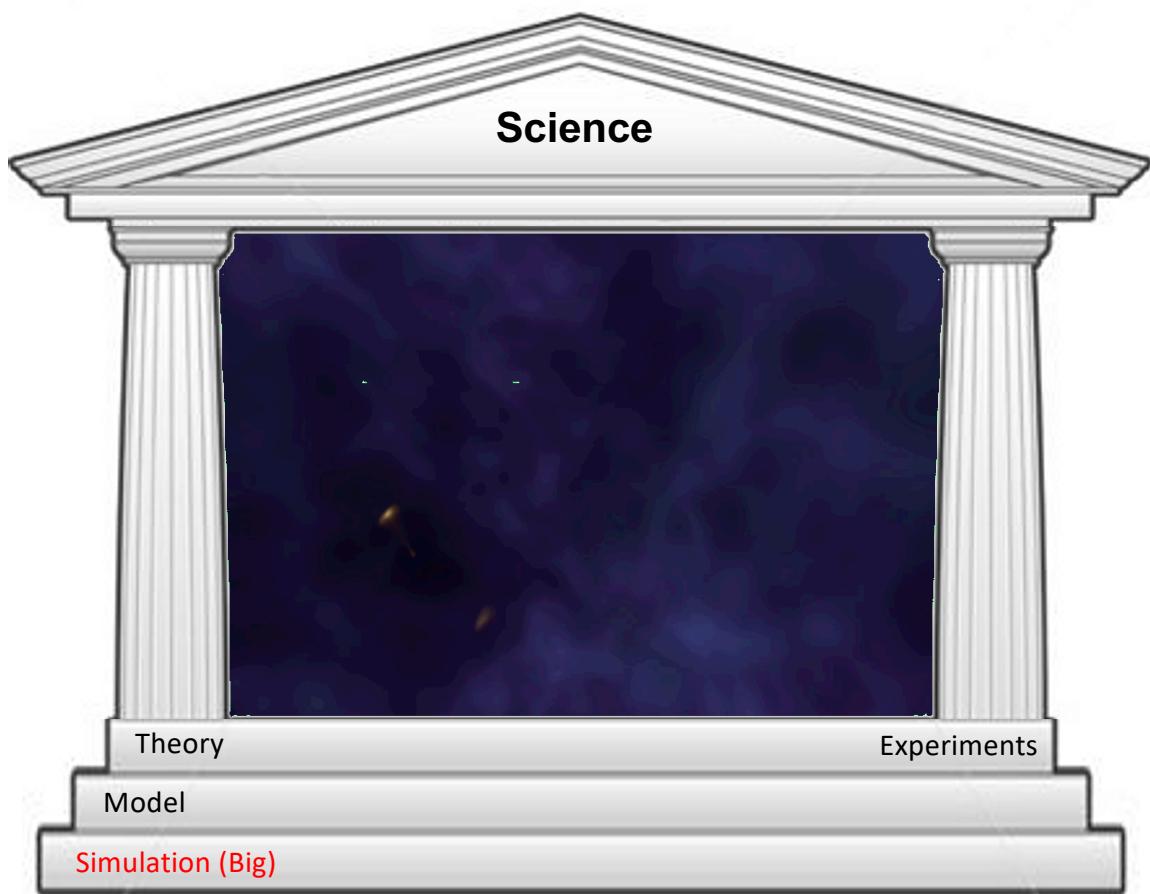
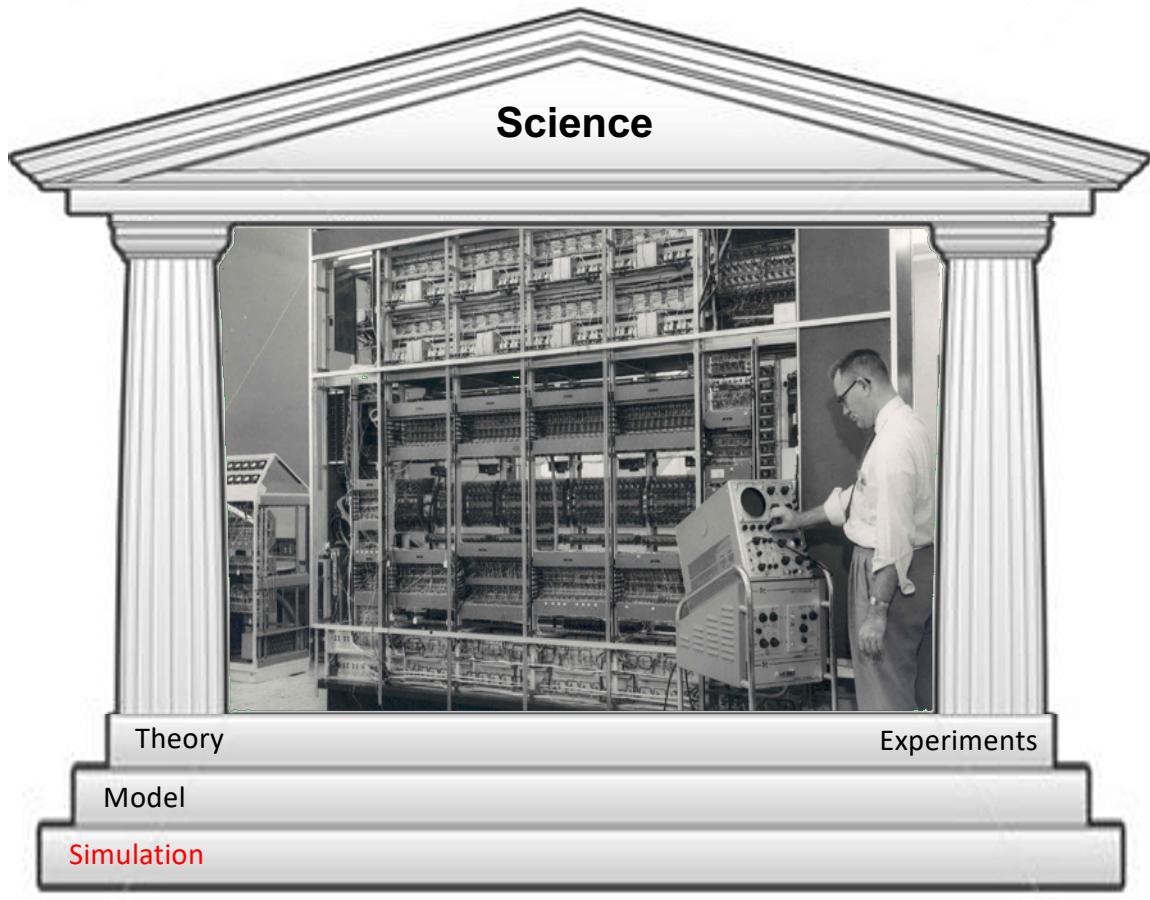
Supernova simulation, Dr. Wolfgang Bauer

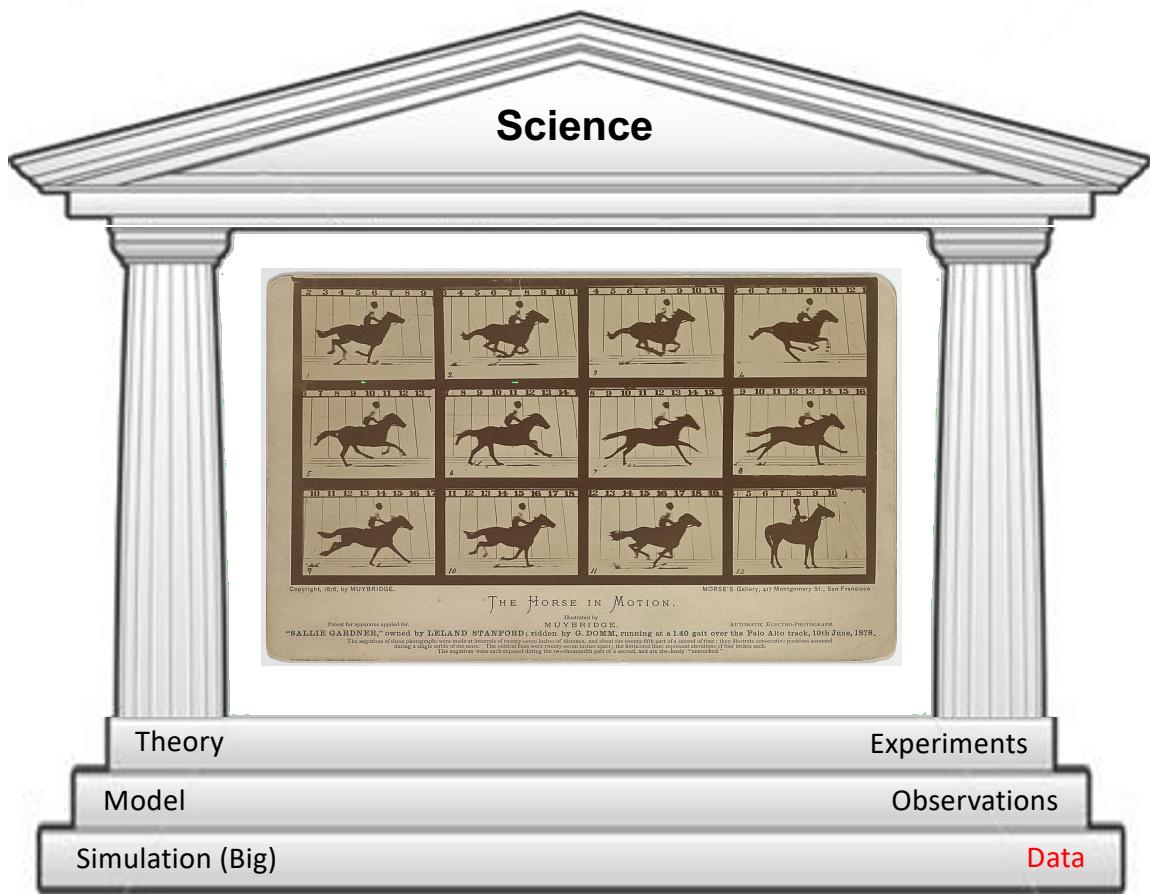
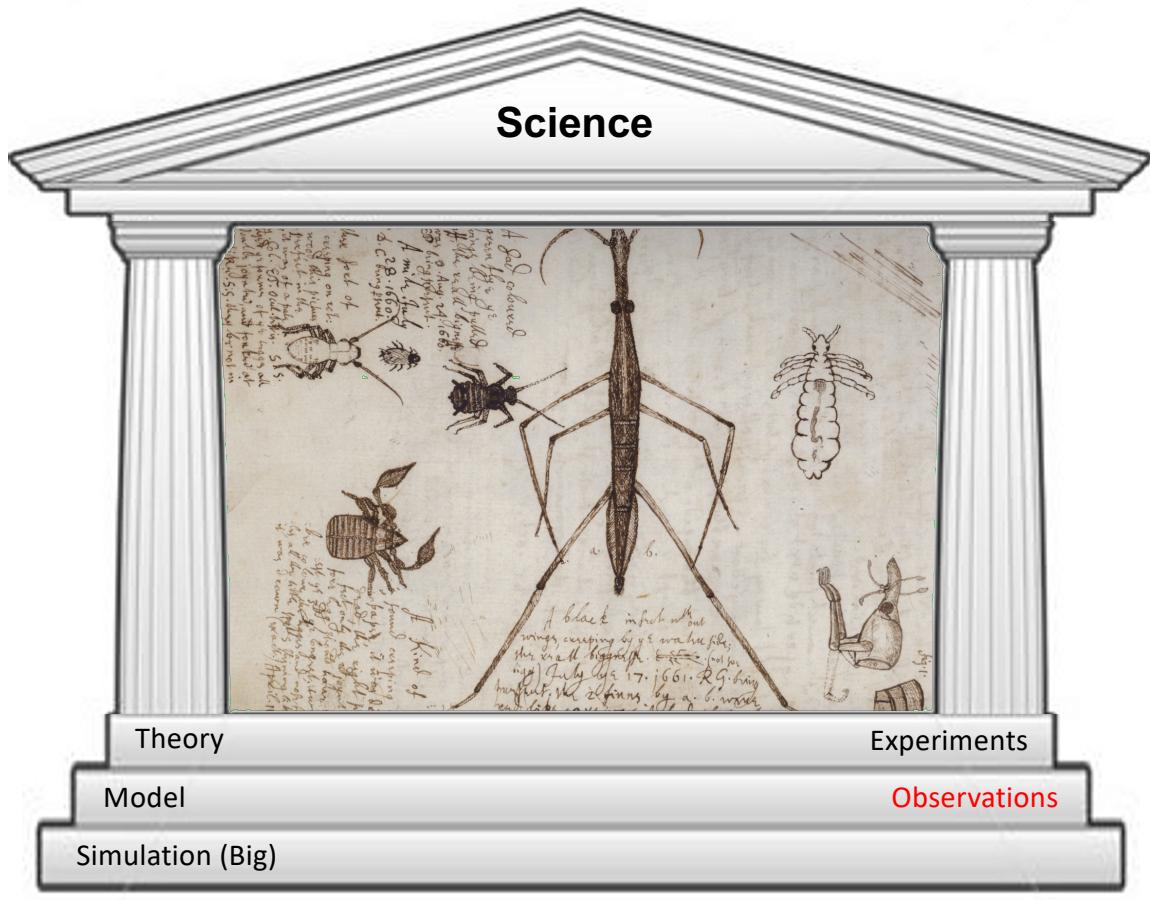


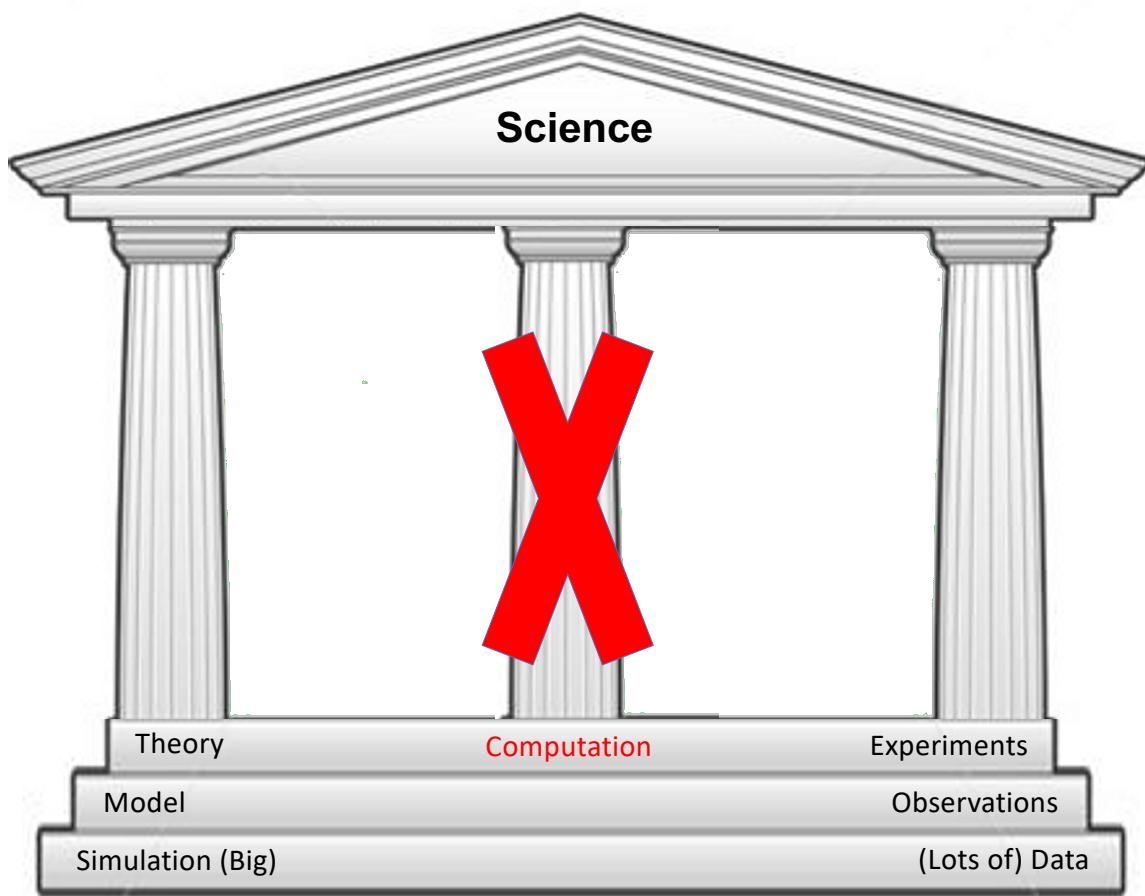
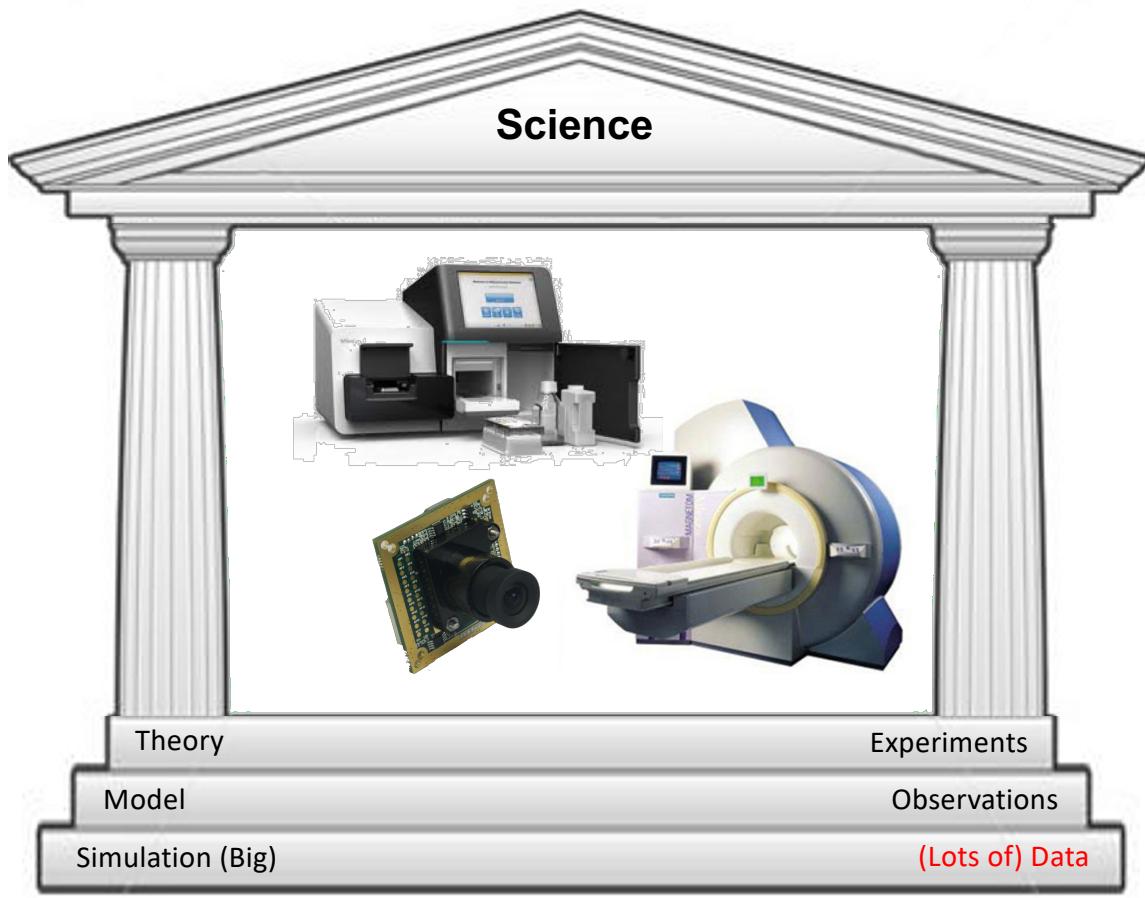
CyberAmbassadors

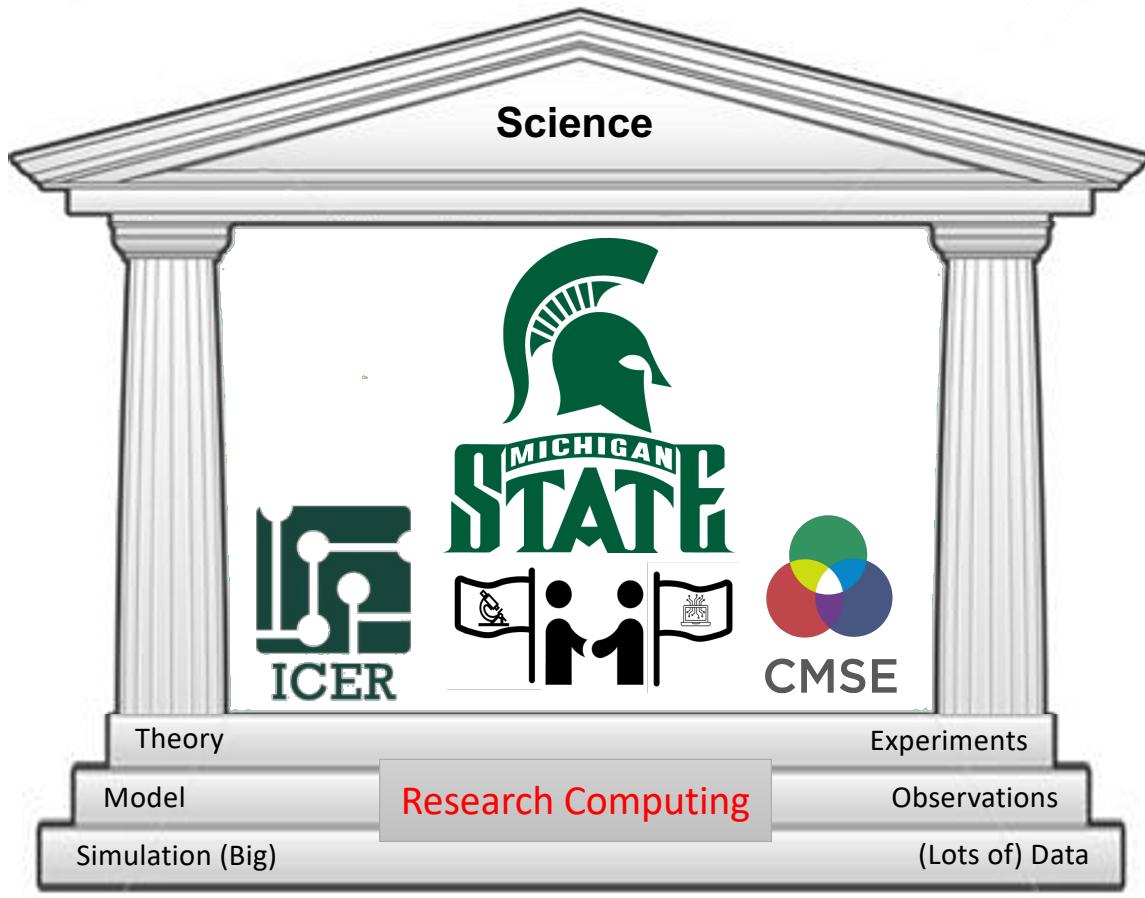
- Advanced Professional Skills Training for CI Professionals
 - Teamwork
 - Leadership
 - Communication
- Drs. Dirk and Katy Colbry











What problems are we solving?

- Boundary Simulations
- Data Analysis
- Search

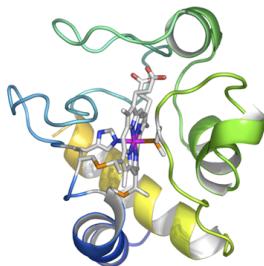
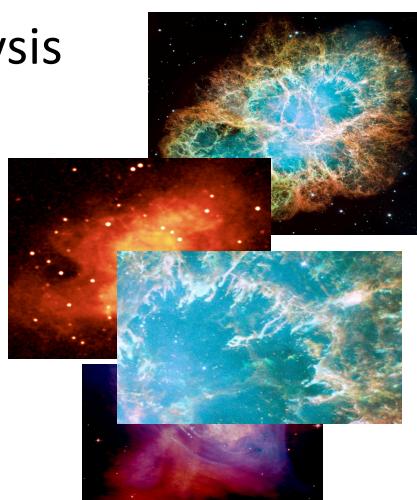
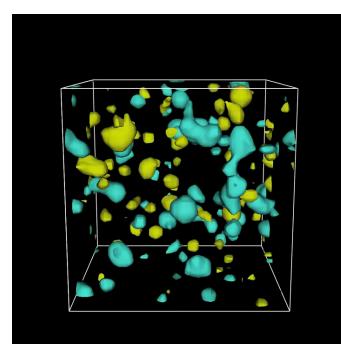


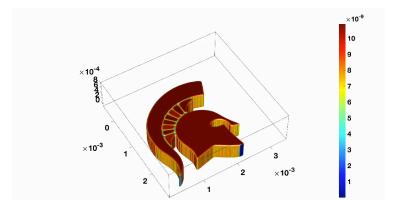
Image provided by
Dr. Warren F. Beck, MSU



Images from, "Understanding the H₂ Emission from the Crab Nebula", C.T. Richardson, J.A. Baldwin, G.J. Ferland, E.D. Loh, Charles A. Huehn, A.C. Fabian, P.Salomé

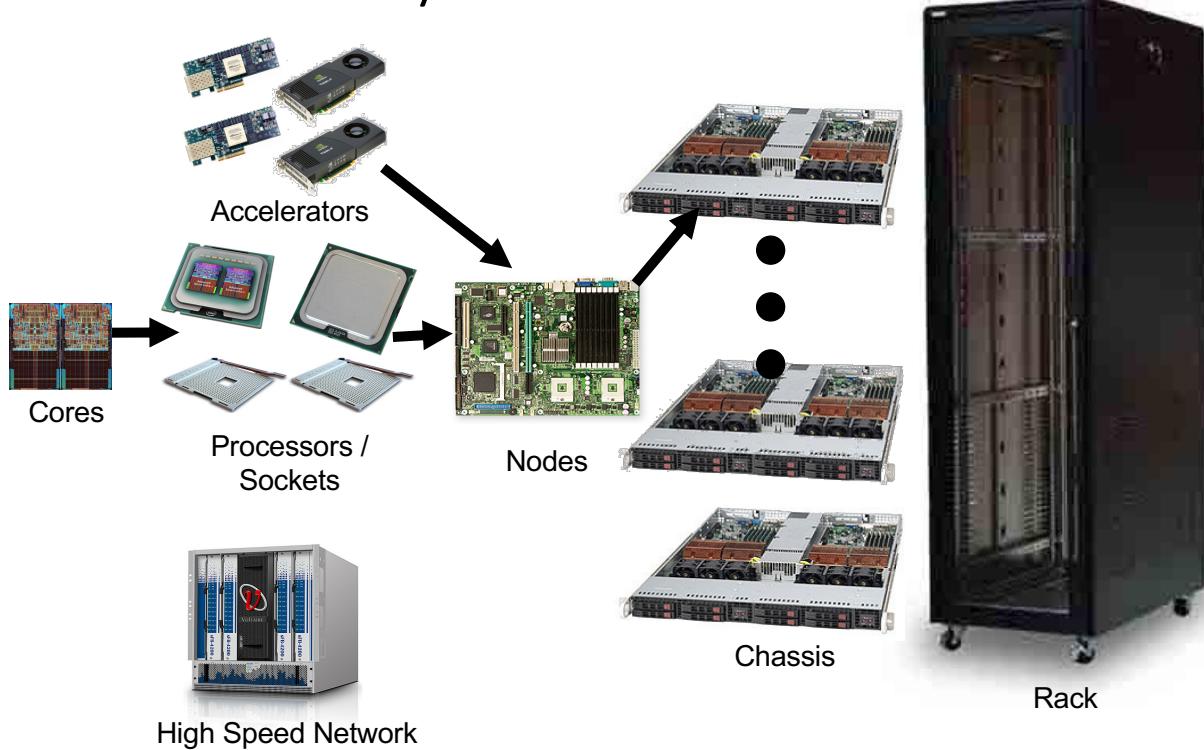


Dr. Huey-Wen Chen

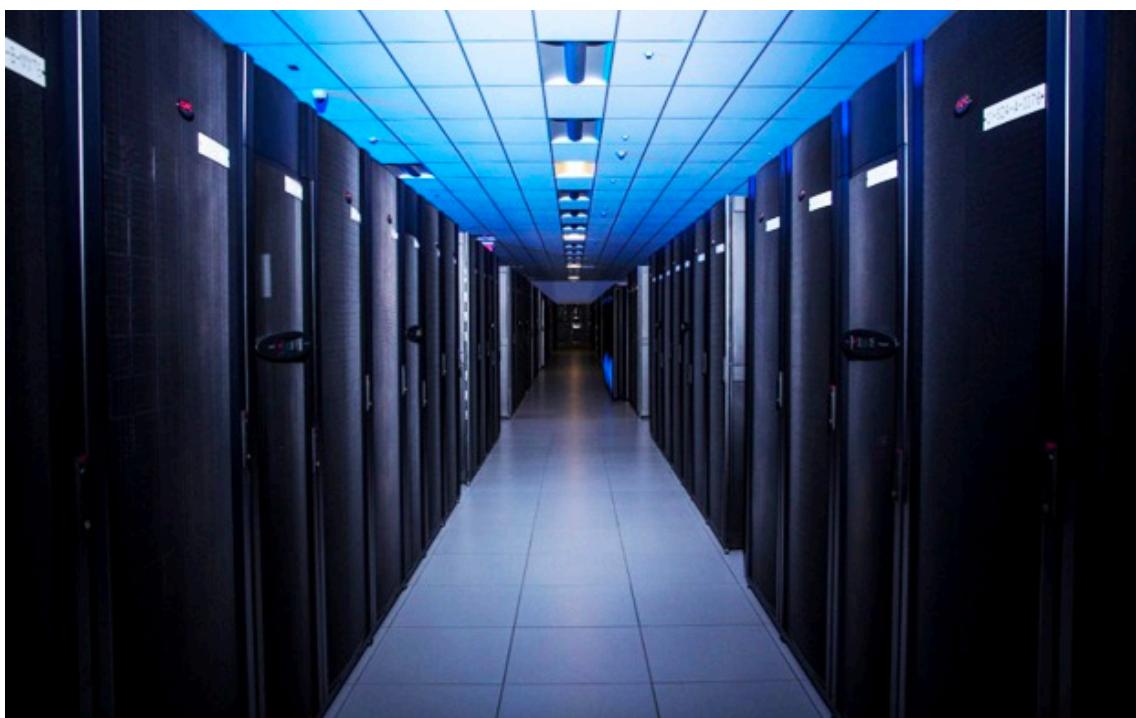


Dr. Hui-Chia Yu

Commodity Cluster



Data Center





Portable HPC

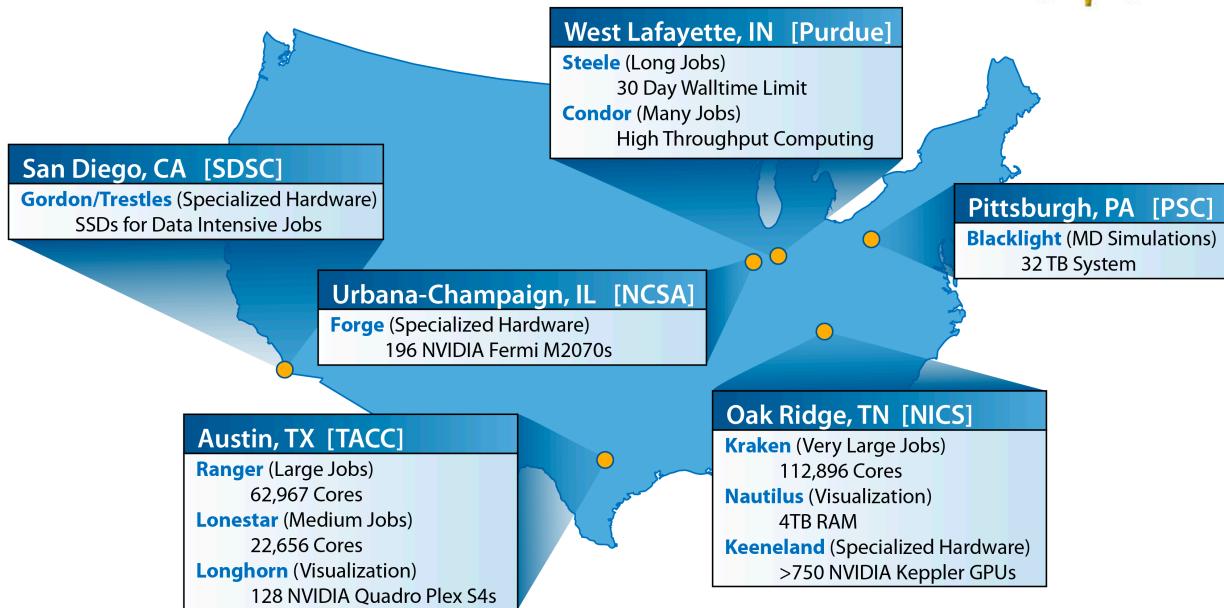


“Cloud” Computing

(Data, Hardware and Services over the Internet)



Extreme Science and Engineering
Discovery Environment



CONTACT: HELP@XSEDE.ORG

Note: this map is a few years out of date. But you get the general idea.

Computing Resources?



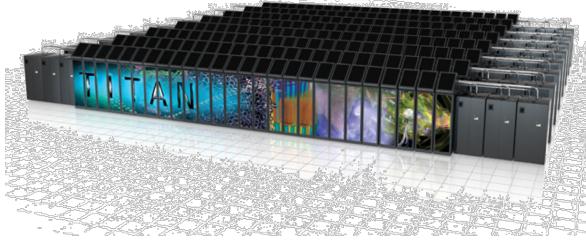
Extreme Science and Engineering
Discovery Environment



ICER



Open Science Grid

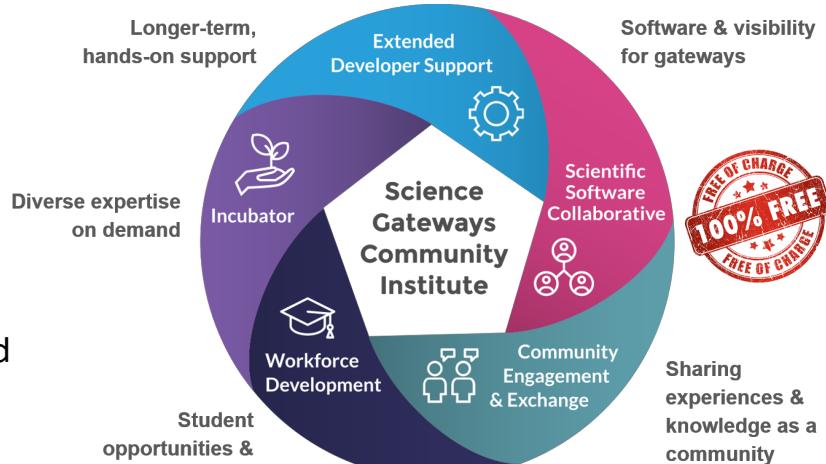


So What?



"Hey Dirk, That was neat. Thanks for showing us all of those cool computers. How does that help me and my team? We don't have really big projects and none of us are computer experts anyway."

- Web interface to online scientific communities which include, common datasets, publications forums, and interactive software.
- Can run programs on HPC resources (Behind the scenes)
- SGCI has multiple programs to help researchers build their own Gateway.

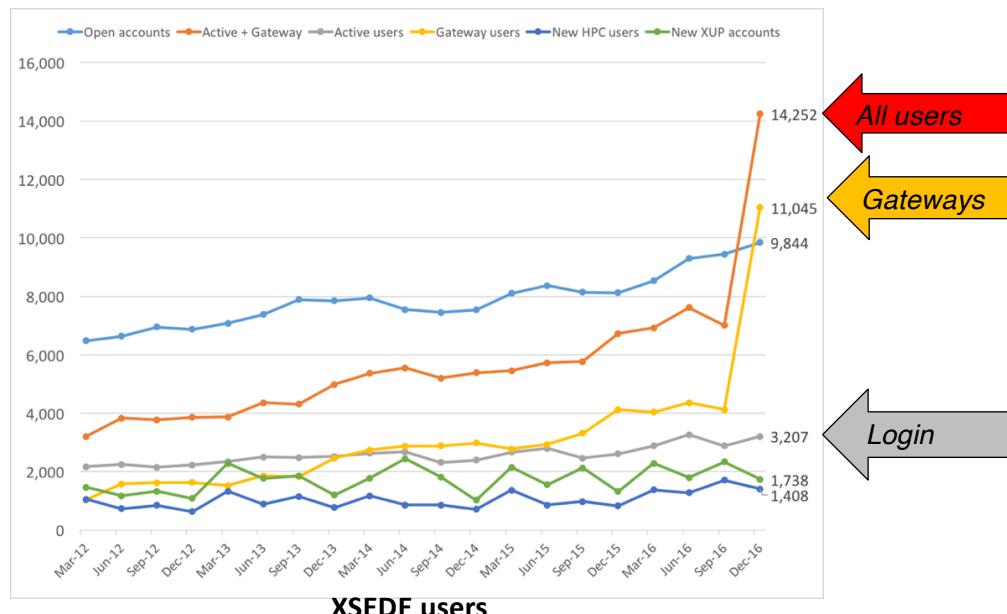


<http://sciencegateways.org>



Science Gateways

Gateway users are 77% of active XSEDE users in Q4 2016



This is largely due to the CIPRES and I-TASSER gateways, but others are gaining

Learning to Code

- Volunteer, non-profit organization that teach foundational coding and data science skills to researchers worldwide
- Solid pedagogical foundation for teaching
- Workshops are all around the world

<https://carpentries.org/>



ECSS

Extended Collaborative Support Services

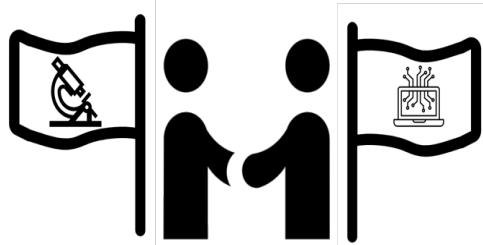


Team of CI Professionals dedicated to helping researchers utilize computational systems.

- performance analysis
- petascale optimization
- efficient use of accelerators
- I/O optimization
- data analytics
- visualization
- use of XSEDE by science gateways
- workflows

Where to Start?

- Most Universities have their own HPC or Supercomputing Center
- See if your institution has a campus champion.
- See if a nearby institution has a campus champion.
- Email me



CyberAmbassadors

- Advanced Professional Skills Training for CI Professionals
 - Teamwork
 - Leadership
 - Communication
- Drs. Dirk and Katy Colbry

Questions?

colbrydi@msu.edu