

Reproducibility, Replicability, and Robustness in Science

MPSAC Meeting, 11/18/2016

Bogdan Mihaila

MPS/PHY and MPS/OAD (detail)

Clark Cooper

MPS/OAD



Response to date:

- NSF Director's Symposium on Robust and Reliable (R&R) Science: The Path Forward, 9 Sep 2015.
- Appointment (six-month detail, followed by a six-month detail extension), MPS Science Advisor for Robust and Reliable Science: Bogdan Mihaila (MPS/PHY). 9 May 2016.
- Goal: identify and assess opportunities in R&R science that are germane to MPS disciplines and propose approaches to capitalize on them.
- MPS revised its data management plan (DMP). Single, uniform DMP for all five disciplinary divisions. 24 Jun 2016.

Workshop – MPS, BIO/MCB, CISE/ACI
PI: Dave Weitz, Harvard University
Keck Center, UCI, 2/25-26/2017

GOAL: Catalyzing a robust and reliable scientific enterprise

- Develop a lexicon: Robustness. Resilience. Rigor. Reliability. Repeatability. Reproducibility. Replicability. Accuracy. Precision.
- Identify common aspects of (ir)reproducibility across communities represented at the workshop.
- Propose a roadmap for engaging the community.
- Document findings in a report to NSF.

Topics to be discussed at the workshop:

- I. Lack of Reproducibility: Feature *or* Flaw?
- II. Theory and Experimentation in Science.
- III. Precision. Statistics. Software.
- IV. Fundamentals of scientific reporting.

		Tradition of controlled experiments	
		No	Yes
Strong basic theory	No	Epidemiology	Clinical Sciences ← CRISIS!
	Yes	Astronomy	Particle physics

Roger Peng (JHU) [A Simple Explanation for the Replication Crisis in Science](#), Simply Statistics blog

Actions:

- Develop roadmap for training, promoting effective practices, and future community-specific workshops and summer schools.
- Integrate on-going activities regarding the Public Access to Results from NSF-Supported Research.

Possible course of action for further discussion

- Explore with publishers: Store/serve data used for Figures in publications. Publishers are already committed to store publications in perpetuity. Additional storage capacity requirements are modest.