Reproducibility

Why Now and What Do We Mean ?

EDITORIAL

Science **343**, 229 (2014)

Reproducibility

SCIENCE ADVANCES ON A FOUNDATION OF TRUSTED DISCOVERIES. REPRODUCING AN EXPERIMENT is one important approach that scientists use to gain confidence in their conclusions. Recently, the scientific community was shaken by reports that a troubling proportion of peer-reviewed preclinical studies are not reproducible. Because confidence in results is of paramount importance to the broad scientific community, we are announcing new initiatives to increase confidence in the studies published in *Science*. For preclinical studies (one of the targets of recent concern), we will be adopting recommendations of the U.S. National Institute of Neurological Disorders and Stroke (NINDS) for increasing transparency.* Authors will indicate whether there was a pre-experimental plan for data handling (such as how to deal with outliers), whether they conducted a sample size estimation to ensure a sufficient signal-to-noise ratio, whether samples were treated randomly, and whether the experimenter was blind to the conduct of the experiment. These criteria will be included in our author guidelines.

The Economist

The Economist, Oct 12, 2013

Problems with scientific research

How science goes wrong

Scientific research has changed the world. Now it needs to change itself

Oct 19th 2013 | From the print edition

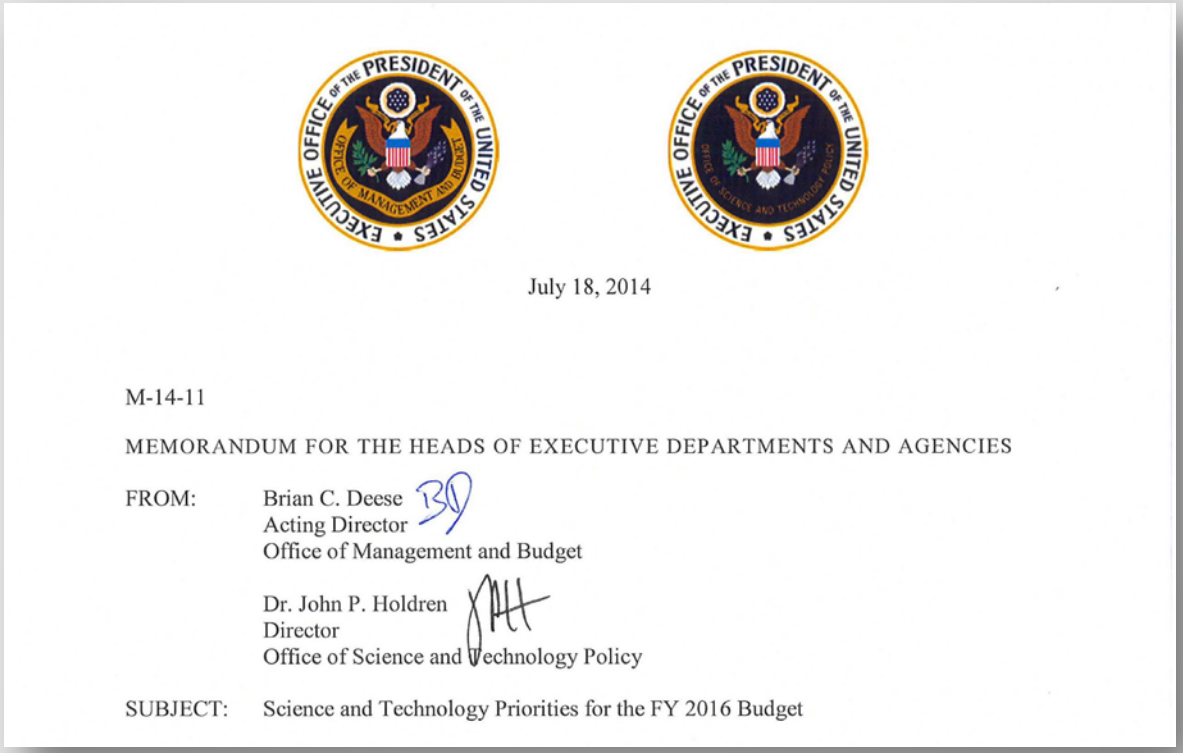
A SIMPLE idea underpins science: "trust, but verify". Results should always be subject to challenge from experiment. That simple but powerful idea has generated a vast body of knowledge. Since its birth in the 17th century, modern science has changed the world beyond recognition, and overwhelmingly for the better.

PNAS **111**, 5773 (2014)

PERSPECTIVE

Reproducibility

Why Now and What Do We Mean ?



July 18, 2014

M-14-11

MEMORANDUM FOR THE HEADS OF EXECUTIVE DEPARTMENTS AND AGENCIES

FROM: Brian C. Deese
Acting Director
Office of Management and Budget

Dr. John P. Holdren
Director
Office of Science and Technology Policy

SUBJECT: Science and Technology Priorities for the FY 2016 Budget

Science and Technology Priorities Memo from OSTP and OMB

At its January 31 meeting, the President's Council of Advisors on Science and Technology discussed concerns about the reproducibility of scientific research. These concerns cut across fields of science. Agencies should engage stakeholders to develop ways to improve the reproducibility of research in the fields they support.

Reproducibility

MPS Initial Plans

Discussions within MPS leadership ➞ Goal: Confidence in the science we fund

Expand discussions: MPS, NSF, and community

Robustness and Verifiability

Determine a quantity by different methods
Observe the same phenomenon by different techniques
Careful analysis and explanation of precision

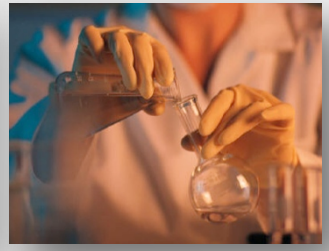
Funding replication of an experiment at expense of new science is a vexing choice

Pressure to produce dramatic, "transformative" results influences behavior

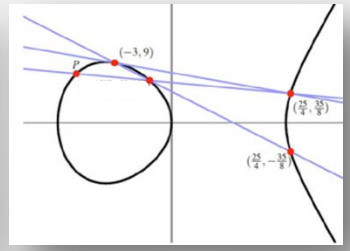
Diversity of MPS sciences leads to a diversity of issues and concerns

Astronomy

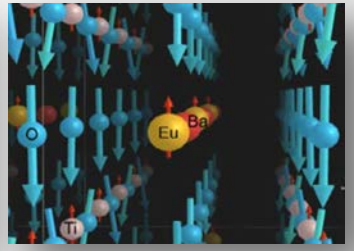
Chemistry



Mathematics



Materials



Physics