

PROVIDING TRUSTED SCIENCE TO INFORM DECISIONS

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Science

Increasing Scrutiny

- Science is informing high-stakes decisions
- Science has become “big business”: prizes, prestige, and commercial consulting



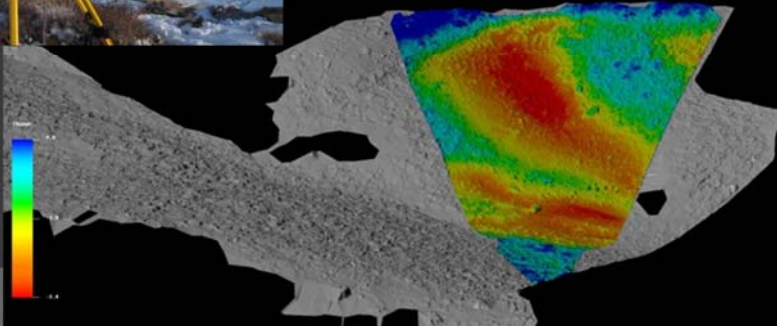
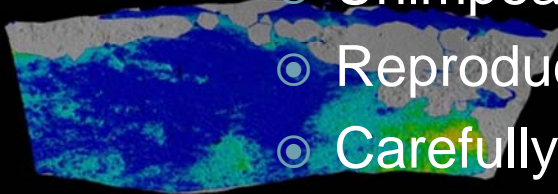
Colbert Report picks up *Science* article on mountaintop mining

Science to Inform Decisions



Must be:

- High quality
- Unimpeachable
- Reproducible
- Carefully documented
- Widely communicated



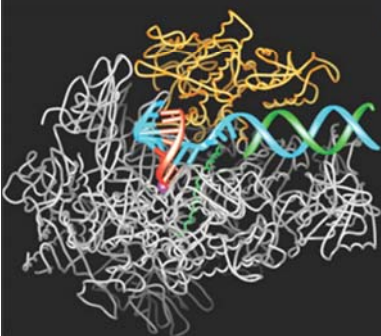
Who is Responsible?



- Academic institutions: teaching ethics and culture of science
- Employers: enforcing scientific integrity policies and valuing ethics
- Journals and Professional Associations: communicating with quality and integrity

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Ethics at Academic Institutions

- Require courses
- Provide a safe route for complaints
- Protect whistleblowers
- Practice what you preach



Publications are increasingly large team efforts. The entire team should be responsible for the integrity of the science.

Scientific Integrity Ethics

INTEGRITY

- All US Federal Agencies developed policies in response to a Presidential directive
<http://goldenkeyhq.files.wordpress.com/2009/09/ethics-sign1.jpg> <http://s604.photobucket.com/albums/tt122/stepitupqueen/>
- Directive was result of complaints of political interference in scientific findings of government researchers in prior administrations
- Department of the Interior was the first to comply

Effective Scientific Integrity

Policy

- Applies to all including contractors, grant recipients
- Grants freedom for scientists to speak to the press
- Protects whistleblowers
- Protects scientists and science from political interference
- Spells out a process for evaluating allegations of wrongdoing
- Spells out the expectations for avoiding bias and COI (real or perceived)
- Is housed within the science organization

<http://goldenkeyho.files.wordpress.com/2009/09/ethics-sign1.jpg>

<http://s604.photobucket.com/albums/tt122/stepitupqueen/>

Quality versus Integrity?



- Need to make the sometimes subtle call as to which issue is involved in a complaint
- Levels of assurance of quality: peer reviewed, published in a high-quality journal, result independently duplicated

Journal Approach to Ethics

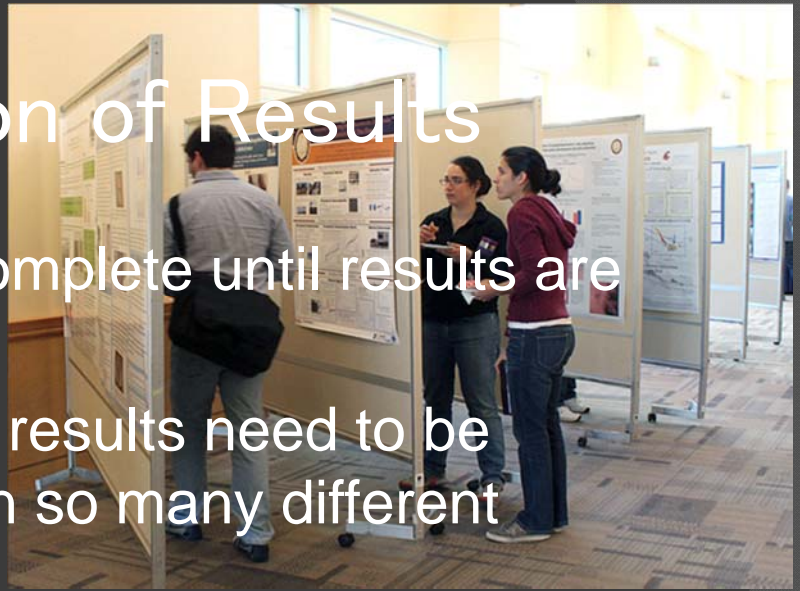
- Authors required to declare any conflicts of interest, state role in producing paper, all approve paper
- Figures carefully checked for evidence of manipulation
- Certain types of research trigger additional questions on research ethics
- Data must be deposited in publicly accessible archive

Remaining Challenges

- Too many pre-clinical studies not reproducible by different research teams
- Investigation of scientific misconduct is the responsibility of the institution, not the journal
- When fraud is detected, some journals are slow to retract papers
- Evidence of shoddy peer review

Communication of Results

- No research is complete until results are communicated
- Challenge is that results need to be communicated on so many different levels:



- To specialists who need to verify results
- To other scientists who are interested in results, methods, data, or other novel discoveries
- To nonscientists (policy makers, managers, etc.)



Science Approach

- For general scientists, communicate via brief (4-5 page reports), perspectives
- For experts, provide online supplemental material
- For non-scientists, provide news coverage, brief synopses

How do you know what material to trust?



- For years peer reviewed journal articles have been the “gold standard” for quality control
- There are now new models for publishing and new methods for providing review
- Are standards slipping?

Who's Afraid of Peer Review?

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- An illustration of a hand holding a pen over a document. The document has a hole punch and a stack of papers below it.
- “Sting” operation conducted by biologist and reporter John Bohannon
 - Tested ability of >300 Open Access journals to detect obvious flaws in phony research paper.
 - More than 50% accepted the paper, 33% rejected, 10% defunct.
 - Disproportionate number of OA journals accepting paper were on predatory list

Science During Crisis

- ◉ A challenge for communication
- ◉ No time for conventional peer review if science is to inform decisions
- ◉ Messages get amplified by crisis



Conclusions

- ◉ Science has never been more important to decision making: it is often one of the more objective inputs to complex issues
- ◉ The integrity of the science must be protected at all costs, requiring a partnership of institutions and journals
- ◉ Communication of science must occur at various levels: to experts, non-specialists, and non-scientists



Questions?