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Science that is
Evidence based
AND above all
Reproducible
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Honest

RESEARCH INTEGRITY FOR THE BIOSCIENCES:

What you need to know

Nikki Osborne BSc. PhD

UKRIO Annual Conference

5th May 2016

Responsible Research In Practice

Research - definition

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- *creative work undertaken in a systematic way to increase the stock of knowledge and use it to devise new applications*

1. asking a question or proposing a hypothesis
2. generating or collating data/information
3. analysing and interpreting the data/information
4. reflecting on the research question or hypothesis and what the data/information tells you

Integrity - Definition

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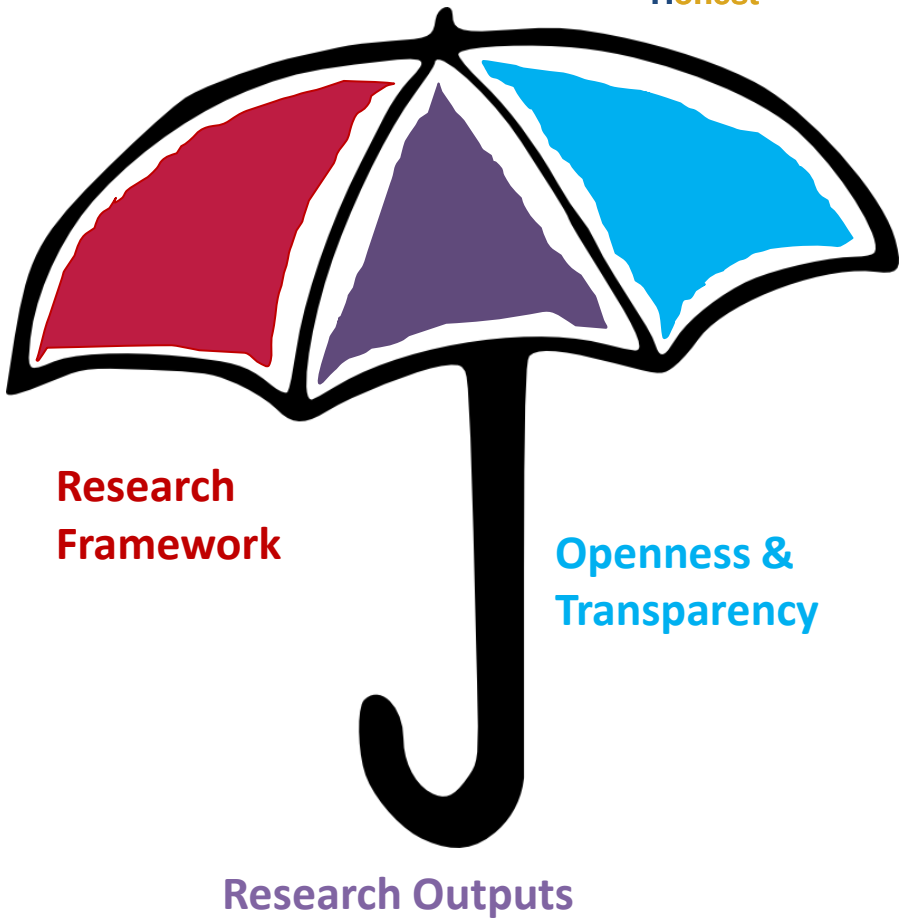
- *a concept of consistency of actions, values, methods, measures, principles, expectations and outcomes*
- *acting in an honest, accurate and truthful way*



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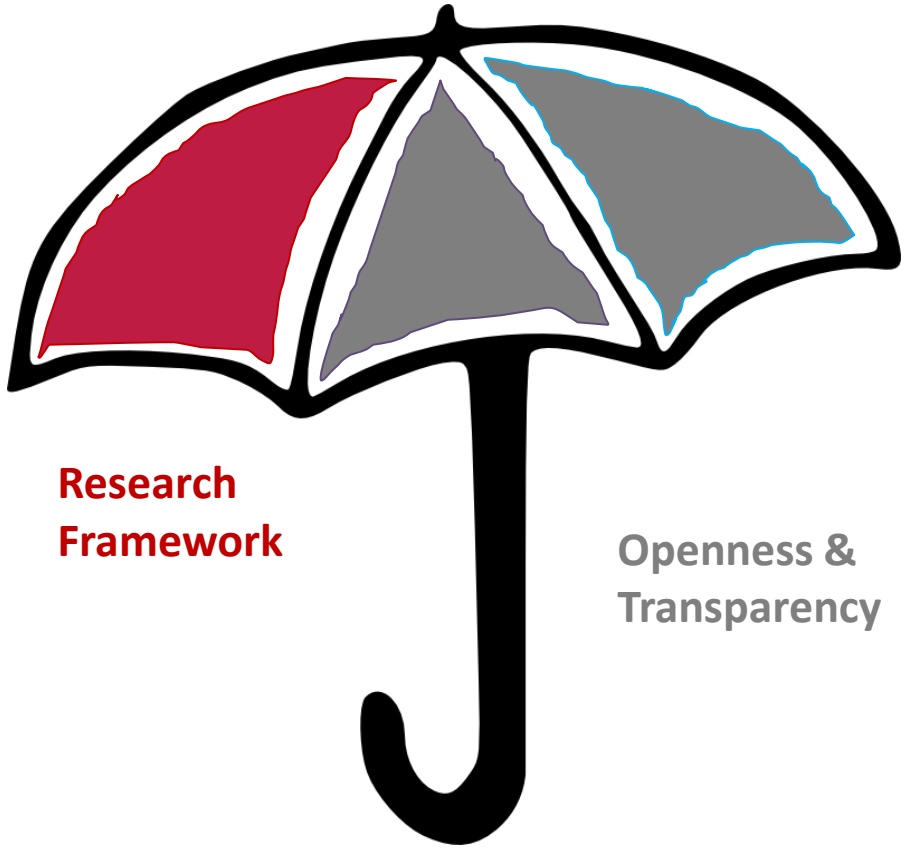

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Research Framework

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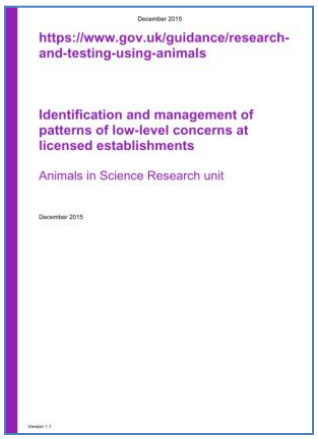
Legislation

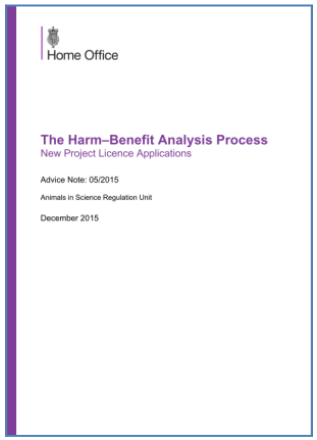

December 2015

https://www.gov.uk/guidance/research-and-testing-using-animals

Identification and management of patterns of low-level concerns at licensed establishments

Animals in Science Research unit

December 2015


Home Office

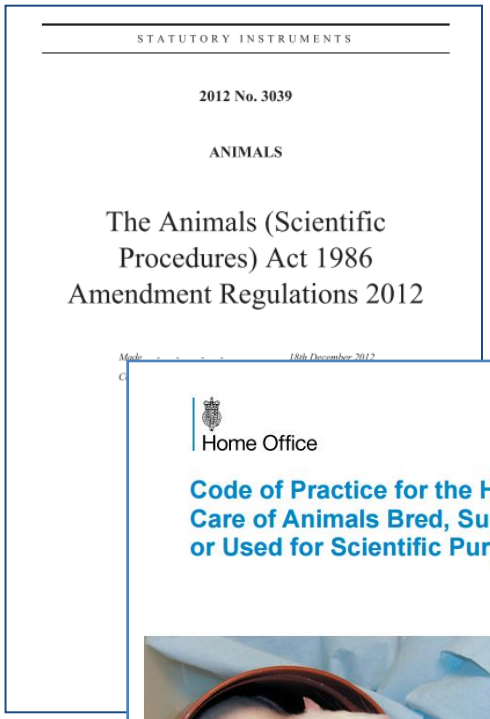
The Harm–Benefit Analysis Process

New Project Licence Applications

Advice Note: 05/2015

Animals in Science Regulation Unit

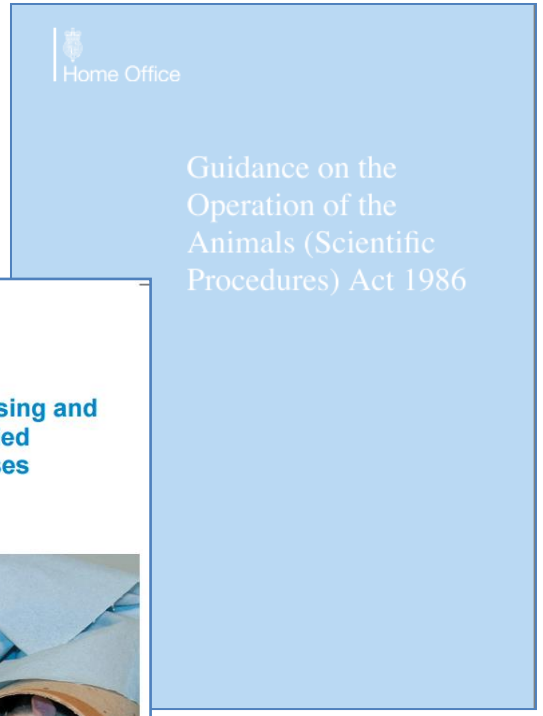
December 2015


STATUTORY INSTRUMENTS

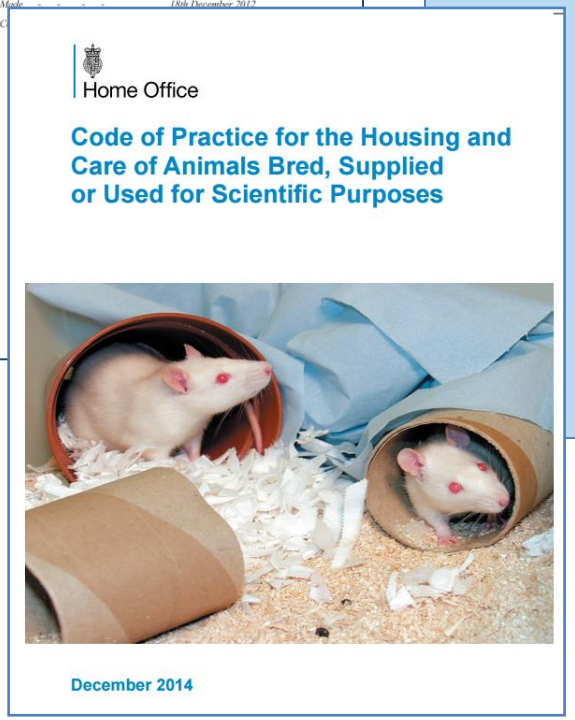
2012 No. 3039

ANIMALS

The Animals (Scientific Procedures) Act 1986 Amendment Regulations 2012


Home Office

Guidance on the Operation of the Animals (Scientific Procedures) Act 1986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Code of Practice for the Housing and Care of Animals Bred, Supplied or Used for Scientific Purposes

December 2014

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Nuffield Council on Bioethics

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We acknowledge that the UK has the most detailed legislative framework concerning research on animals in the world. But proper attention to the welfare of animals involved in research and the accountability of scientists who conduct research on animals cannot be achieved merely by having detailed regulations. Regulation can act as an emotional screen between the researcher and an animal, possibly encouraging researchers to believe that simply to conform to regulations is to act in a moral way. It is therefore crucial to promote best practice more actively and to improve the culture of care in establishments licensed to conduct experiments on animals.

Research Framework

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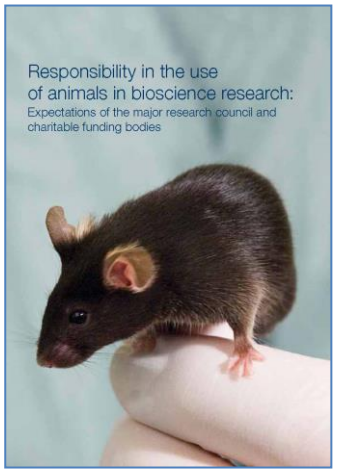
Legislation

Policies



Concordat On Open Research Data

Version 10

July 17th 2015

This document contains the substantive text of the Concordat On Open Research Data that has been developed by a UK multi-stakeholder group. This concordat will help to ensure that the research data gathered and generated by members of the UK research community is made openly available for use by others wherever possible in a manner consistent with relevant legal, ethical and regulatory frameworks and norms.

In this concordat, the following definition has been adopted:

Research Data are quantitative information or qualitative statements collected by researchers in the course of their work by experimentation, observation, interview or other methods. Data may be raw or primary (e.g. direct from measurement or collection) or derived from primary data for subsequent analysis or interpretation (e.g. cleaned up or as an extract from a larger data set). The purpose of open research data is to provide the information necessary to support or validate a research project's observations, findings or outputs. Data may include, for example, statistics, collections of digital images, sound recordings, transcripts of interviews, survey data and fieldwork observations with appropriate annotations.

ARRIVE

CONSORT

equator network

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http://www.biosharing.org

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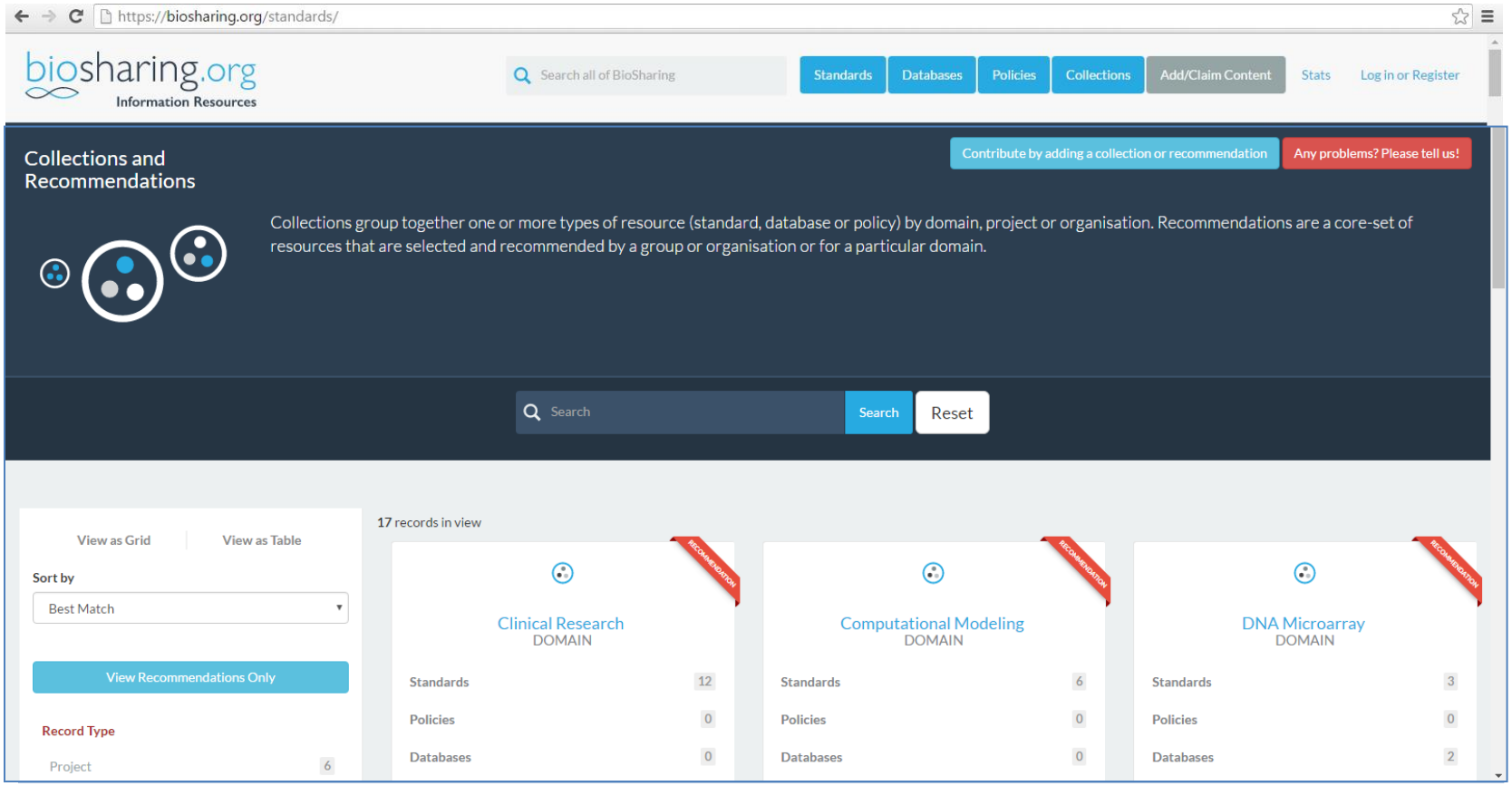

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Research Framework

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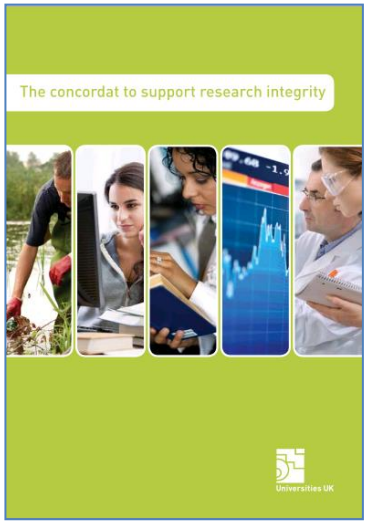

Guidance

Responsible Research
In Practice

The concordat to support research integrity

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Signatories

RESEARCH COUNCILS UK

wellcome trust

Scottish Funding Council
Promoting further and higher education

NHS National Institute for Health Research

Department for Employment and Learning
www.delni.gov.uk

HIGHER EDUCATION FUNDING COUNCIL FOR ENGLAND hefce

Universities UK

Cyngor Cyllido Addysg Uwch Cymru
Higher Education Funding Council for Wales
hefcw

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Honesty

Rigour

COMMITMENT #1:

We are committed to maintaining the highest standards of rigour and integrity in all aspects of research.

Care & Respect

Openness & Transparency

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Legislation

Policies

COMMITMENT #2:

We are committed to ensuring that research is conducted according to appropriate ethical, legal and professional frameworks, obligations and standards.

Guidance

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COMMITMENT #3:

We are committed to supporting a research environment that is underpinned by a culture of integrity and based on good governance, best practice and support for the development of researchers.

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‘Culture’ is the product of…

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Image Credit: RSPCA

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fabrication

falsification

COMMITMENT #4:

We are committed to using transparent, robust and fair processes to deal with allegations of research misconduct should they arise.

failure

improper

plagerism

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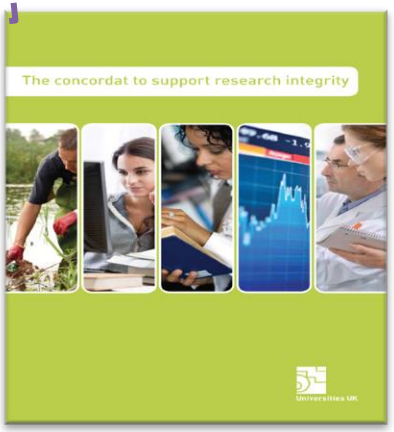

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COMMITMENT #5:

We are committed to working together to strengthen the integrity of research and to reviewing progress regularly and openly.

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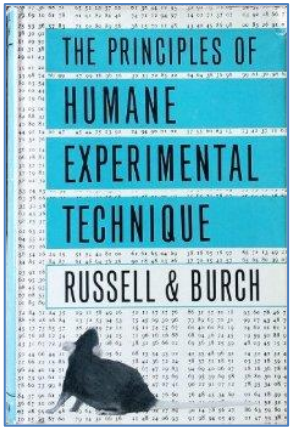
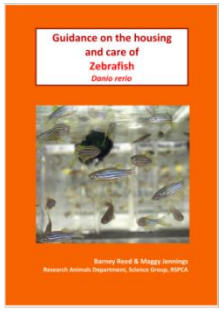
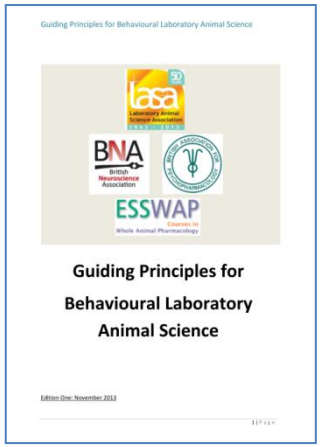
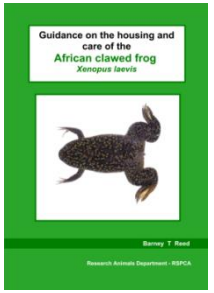


Policies



Others





Guidance

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Responsible Research
In Practice

Openness & Transparency

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Public Engagement

"..the embedding of public engagement in institutional cultures is best understood as a *work in progress.*"

"..the projects suggests that public engagement is more firmly embedded in the context of arts, humanities and social sciences than it is among researchers in science, technology, engineering and mathematics."

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TNS-BMRB & PSI 'Factors Affecting Public Engagement by Researchers: A study on behalf of a Consortium of UK public research funders.' Wellcome Trust; 2015 www.wellcome.ac.uk/PERSurvey

Openness & Transparency

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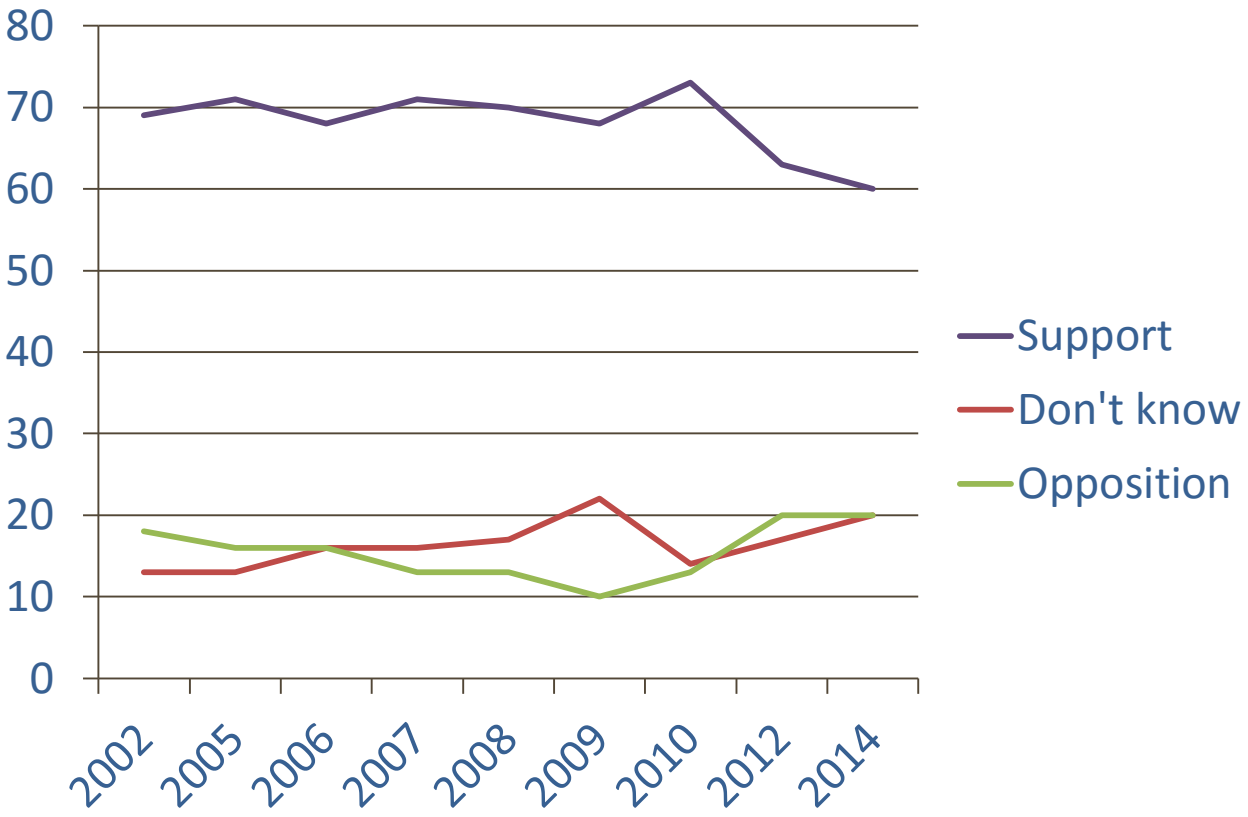
Why is this important?

"I agree with animal experimentation for all types of medical research, where there is no alternative"



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Ipsos MORI 'Public attitudes towards animal research' survey conducted for the Department for Business, Innovation and Skills (BIS) – June 2014

Openness & Transparency

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Commitment 1: We will be clear about when, how and why we use animals in research

Commitment 2: We will enhance our communications with the media and the public about our research using animals

Commitment 3: We will be proactive in providing opportunities for the public to find out about research using animals

Commitment 4: We will report on progress annually and share our experiences

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Research Outputs

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Houston, we have a problem…….

Open access, freely available online

Essay

Why Most Published Research Findings Are False

John P. A. Ioannidis

Summary

There is increasing concern that most current published research findings are false. The probability that a research claim is true may depend on study power and bias, the number of other studies on the same question, and, importantly, the ratio of true to no relationships among the relationships probed in each scientific field. In this framework, a research finding is less likely to be true when the studies conducted in a field are smaller; when effect sizes are smaller; when there is a greater number and lesser preselection of tested relationships; where there is greater flexibility in designs, definitions, outcomes, and analytical modes; when there is greater financial and other interest and prejudice; and when more teams are involved in a scientific field in chase of statistical significance. Simulations show that for most study designs and settings, it is more likely for a research claim to be false than true. Moreover, for many current scientific fields, claimed research findings may often be simply accurate measures of the prevailing bias. In this essay, I discuss the implications of these problems for the conduct and interpretation of research.

factors that influence this problem and some corollaries thereof.

Modeling the Framework for False Positive Findings

Several methodologists have pointed out [9–11] that the high rate of nonreplication (lack of confirmation) of research discoveries is a consequence of the convenient, yet ill-founded strategy of claiming conclusive research findings solely on the basis of a single study assessed by formal statistical significance, typically for a *p*-value less than 0.05. Research is not most appropriately represented and summarized by *p*-values, but, unfortunately, there is a widespread notion that medical research articles

It can be proven that most claimed research findings are false.

should be interpreted based only on *p*-values. Research findings are defined here as any relationship reaching formal statistical significance, e.g., effective interventions, informative predictors, risk factors, or associations. "Negative" research is also very useful. "Negative" is actually a misnomer, and is characteristic of the field and can vary a lot depending on whether the field targets highly likely relationships or searches for only one or a few true relationships among thousands and millions of hypotheses that may be postulated. Let us also consider, for computational simplicity, circumscribed fields where either there is only one true relationship (among many that can be hypothesized) or the power is similar to find any of the several existing true relationships. The pre-study probability of a relationship being true is $R/(R+1)$. The probability of a study finding a true relationship reflects the power $1-\beta$ (one minus the Type II error rate). The probability of claiming a relationship when none truly exists reflects the Type I error rate, α. Assuming that c relationships are being probed in the field, the expected values of the 2×2 table are given in Table 1. After a research finding has been claimed based on achieving formal statistical significance, the post-study probability that it is true is the positive predictive value, PPV. The PPV is also the complementary probability of what Wacholder et al. have called the false positive report probability [10]. According to the 2×2 table, one gets PPV = $(1-\beta)R/(R$

Key issues:

- lack of reproducibility
- bias
- competition

Conclusions:

- most research findings are false for most research designs and for most fields.
- research findings may often be simply accurate measures of prevailing bias.

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Research Outputs

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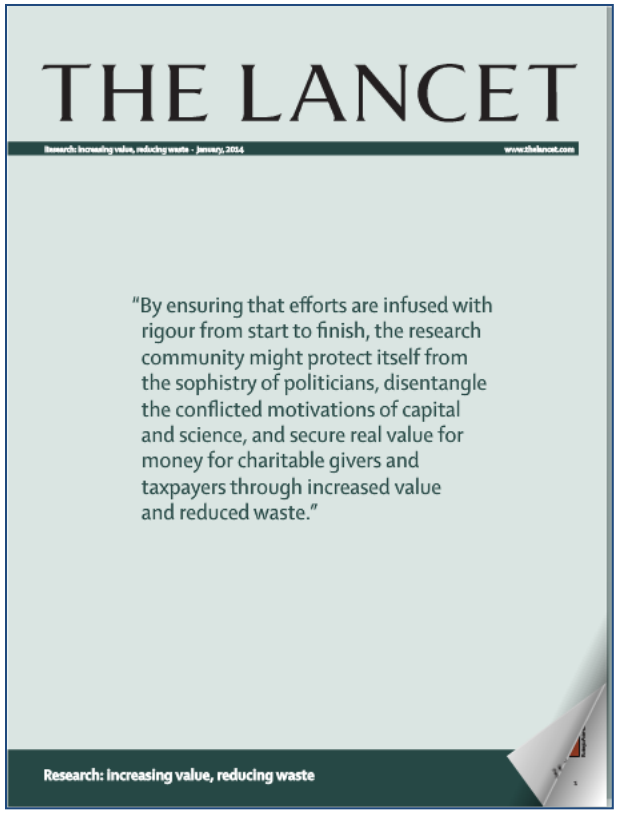
Reflecting current practice….



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Research Outputs

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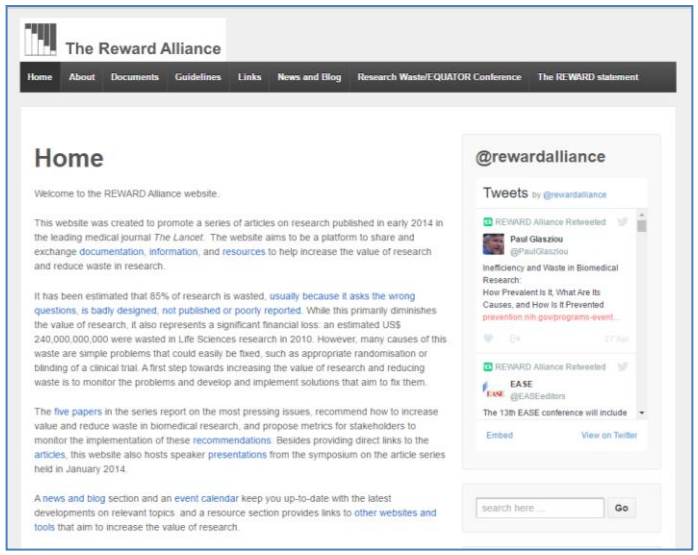
Reflecting current practice….

REWARD
REduce research Waste
And Reward Diligence



The REWARD Statement

We recognise that, while we strive for excellence in research, there is much that needs to be done to reduce waste and increase the value of our contributions. We maximise our research potential when:

- we set the right research priorities;
- we use robust research design, conduct and analysis;
- regulation and management are proportionate to risks;
- all information on research methods and findings are accessible;
- reports of research are complete and usable.

We believe we have a responsibility not just to seek to advance knowledge, but also to advance the practice of research itself. This will contribute to improvement in the health and lives of all peoples, everywhere. As funders, regulators, commercial organisations, publishers, editors, researchers, research users and others – we commit to playing our part in increasing value and reducing waste in research."

If your organisation would like to sign up to *The Lancet*'s REWARD campaign, and you endorse and support the statement above, **click here** to send your logo and URL to Sabine Kleinert and Tamara Lucas, for display on *The Lancet*'s REWARD campaign page. In addition, please consider providing content for the campaign pages to give examples of the measures your organisation has taken, is taking, and will take to increase value and reduce waste in research.

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Research Outputs

Problems and possible solutions

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Why does any of this matter?

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Disseminate good practice, improve animal welfare & scientific quality

↑ Openness & transparency

↑ the quality of research reporting

↓ the impact of publication bias

↑ the quality of research funded & conducted

\+ = + =

↑ access to unpublished research data

↑ the ability to systematically review the data

↓ wastage of money, animals, other resources

Inform future research

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ANY QUESTIONS ?

nikki@responsibleresearchinpractice.co.uk

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