

# The Research-Impact Cycle

Open access to research output

maximizes

research ***access***

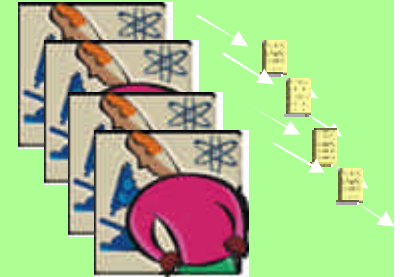
maximizing (and accelerating)

research ***impact***

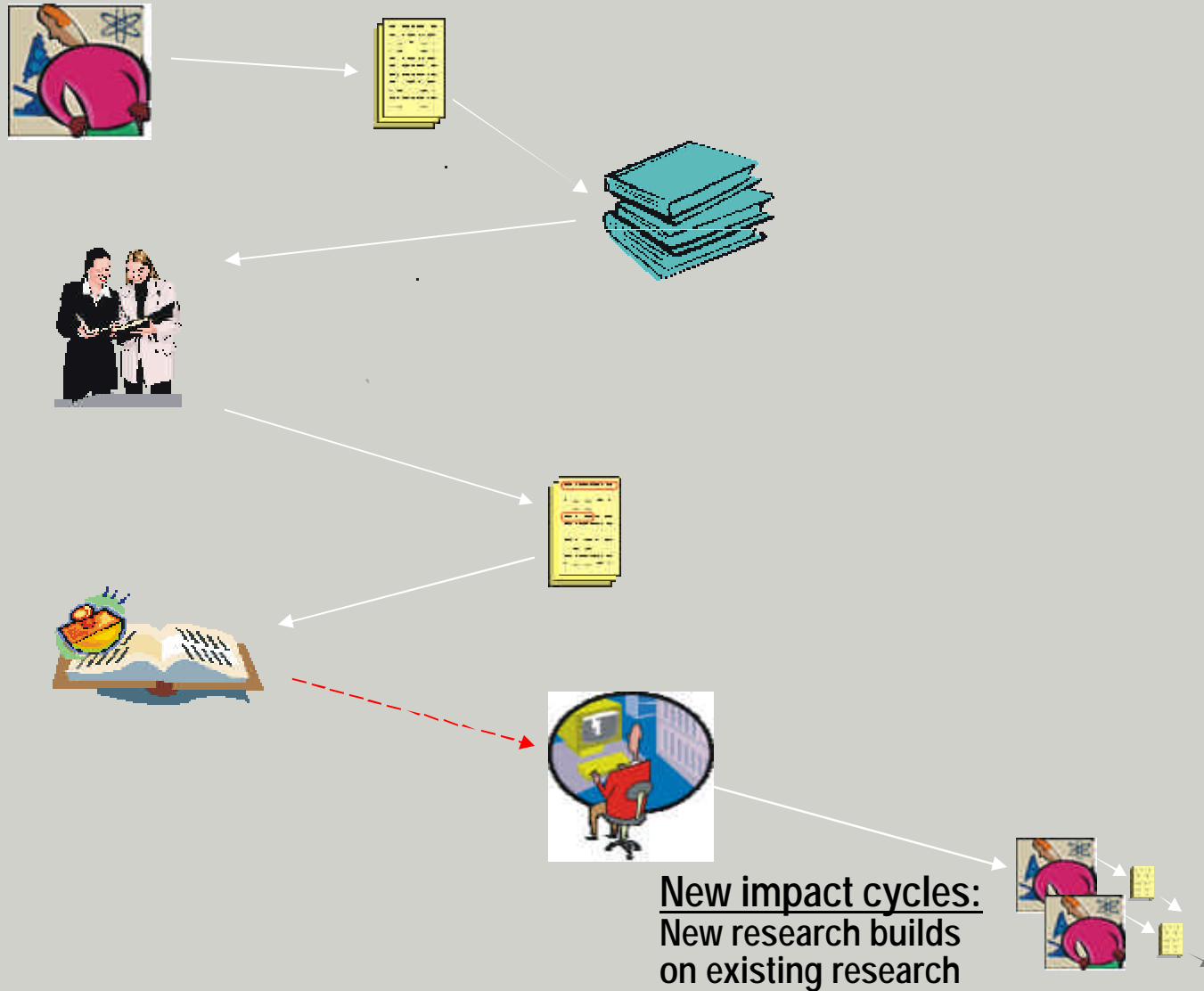
(hence also research ***productivity***

and research ***progress***

and their ***rewards***)



12-18 Months



# Maximized Research Access and Impact Through Self-Archiving

12-18 Months

## Impact cycle begins:

Research is done



Researchers write pre-refereeing "Pre-Print"



Pre-Print is self-archived in University's Eprint Archive



Submitted to Journal



Pre-Print reviewed by Peer Experts – "Peer-Review"



Pre-Print revised by article's Authors

Refereed "Post-Print" Accepted, Certified, Published by Journal



Researchers can access the Post-Print if their university has a subscription to the Journal

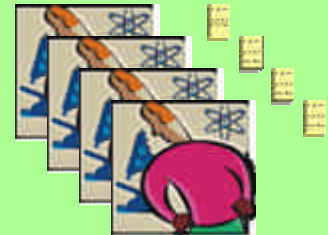


Post-Print is self-archived in University's Eprint Archive



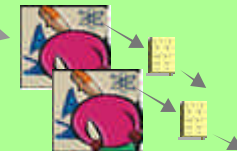
## New impact cycles:

Self-archived research impact is greater (and faster) because access is maximized (and accelerated)

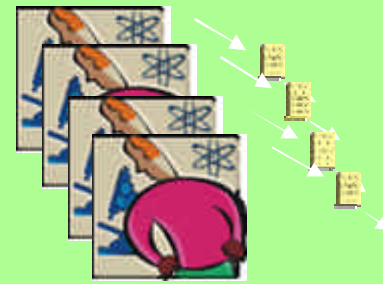


## New impact cycles:

New research builds on existing research

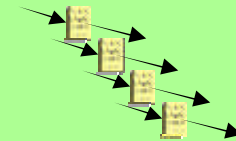


# Research Impact



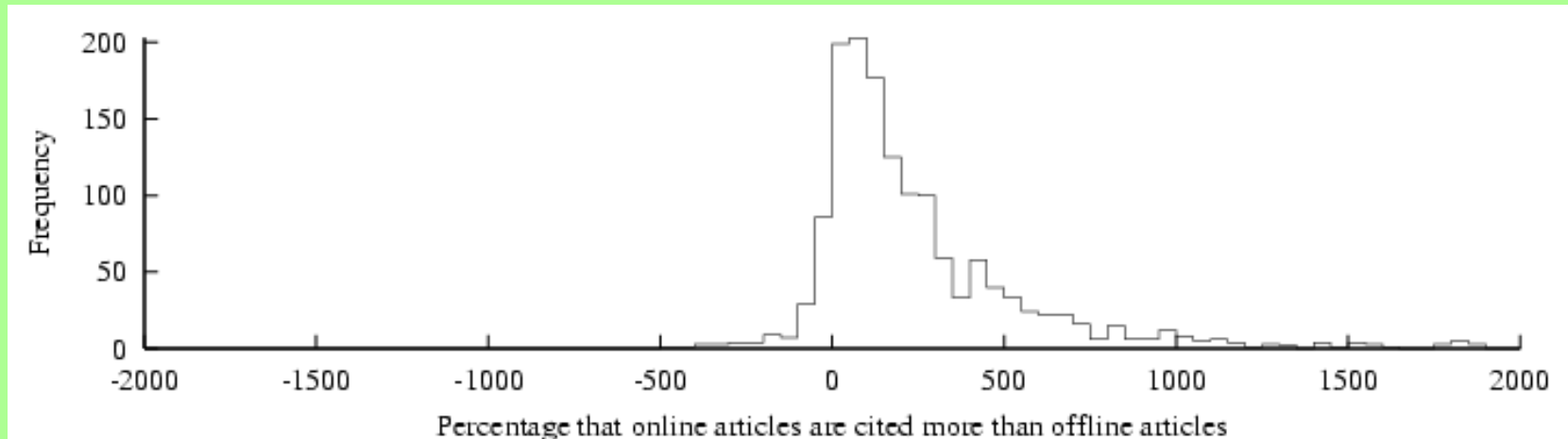
- I. measures the size of a research contribution to further research (“publish or perish”)
- II. generates further research funding
- III. contributes to the research productivity and financial support of the researcher’s institution
- IV. advances the researcher’s career
- V. promotes research progress

# Some old and new scientometric (“publish or perish”) indices of research impact



- Peer-review quality-level and citation-counts of the journal in which the article appears
- citation-counts for the article
- citation-counts for the researcher
- co-citations, co-text, “semantic web” (cited with whom/what else?)
- citation-counts for the preprint
- usage-measures (“hits,” webmetrics)
- time-course analyses, early predictors, etc. etc.

## ***“Online or Invisible?” (Lawrence 2001)***



**“average of 336% more citations to online articles compared to offline articles published in the same venue”**

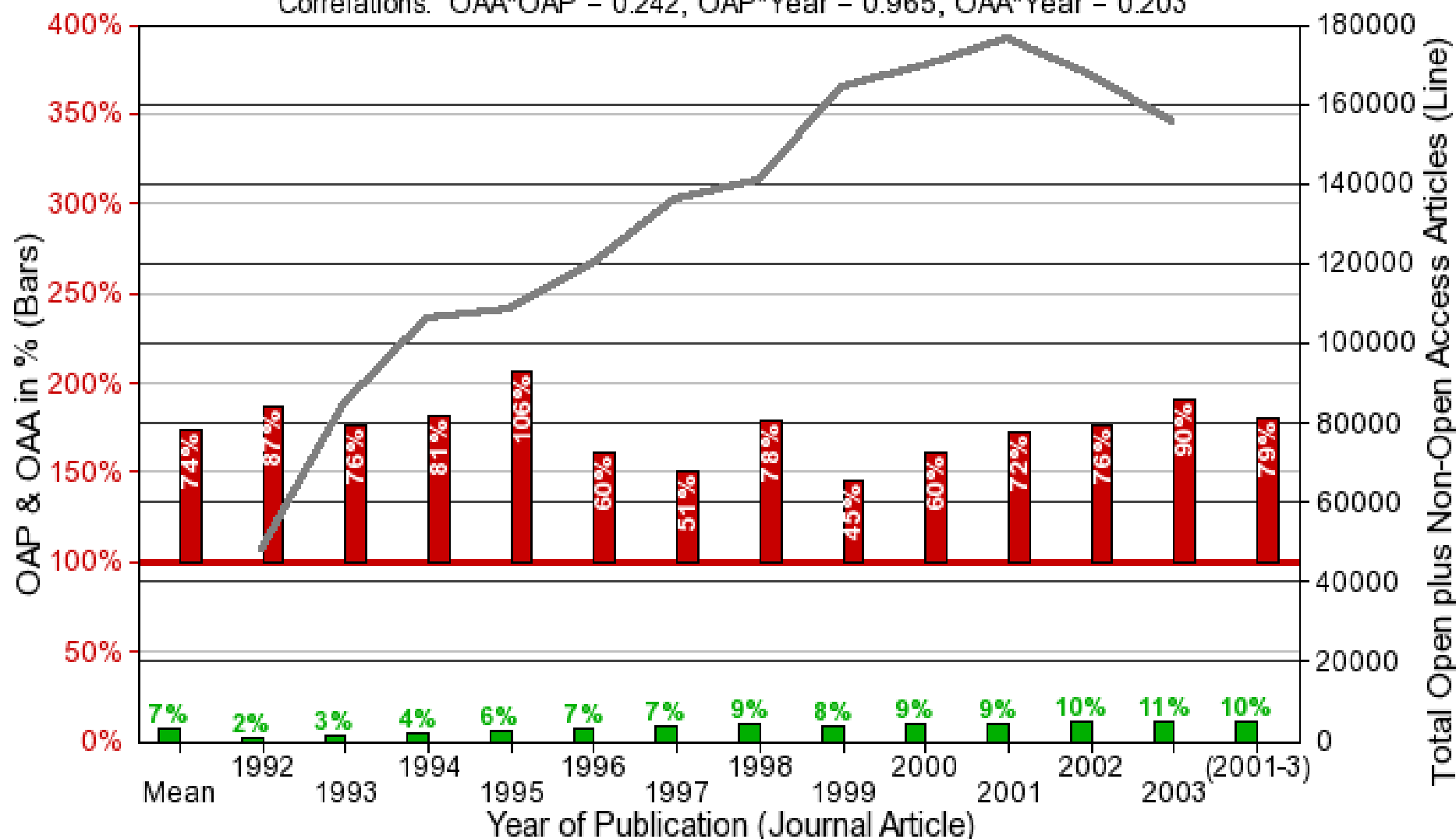
Lawrence, S. (2001) Free online availability substantially increases a paper's impact Nature 411 (6837): 521.

<http://www.neci.nec.com/~lawrence/papers/online-nature01/>

# OA vs. Non-OA Citation Impact Advantage (All fields)

On average 319.9 journals/year (incl. self-citations) - Fri Aug 20 20:37:17 2004

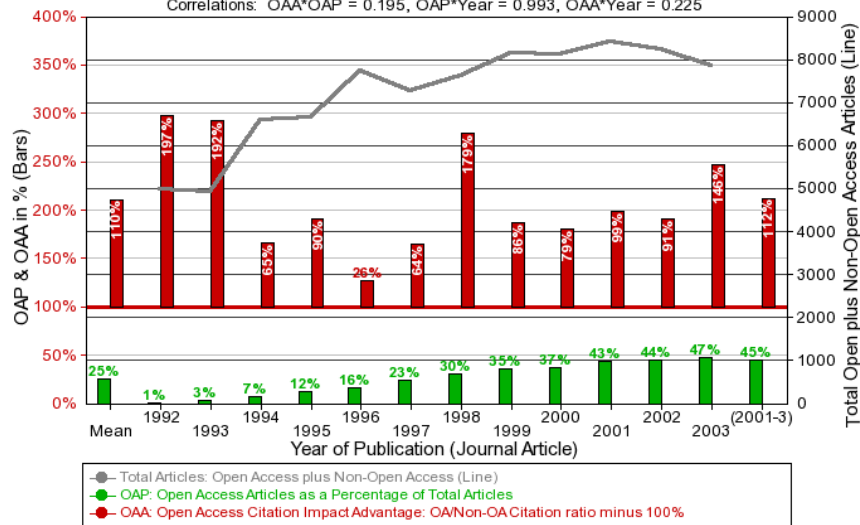
Correlations:  $OAA * OAP = 0.242$ ,  $OAP * Year = 0.965$ ,  $OAA * Year = 0.203$



- Total Articles: Open Access plus Non-Open Access (Line)
- OAP: Open Access Articles as a Percentage of Total Articles
- OAA: Open Access Citation Impact Advantage: OA/Non-OA Citation ratio minus 100%

## OA vs. Non-OA Citation Impact Advantage (Astronomy & Astrophysics)

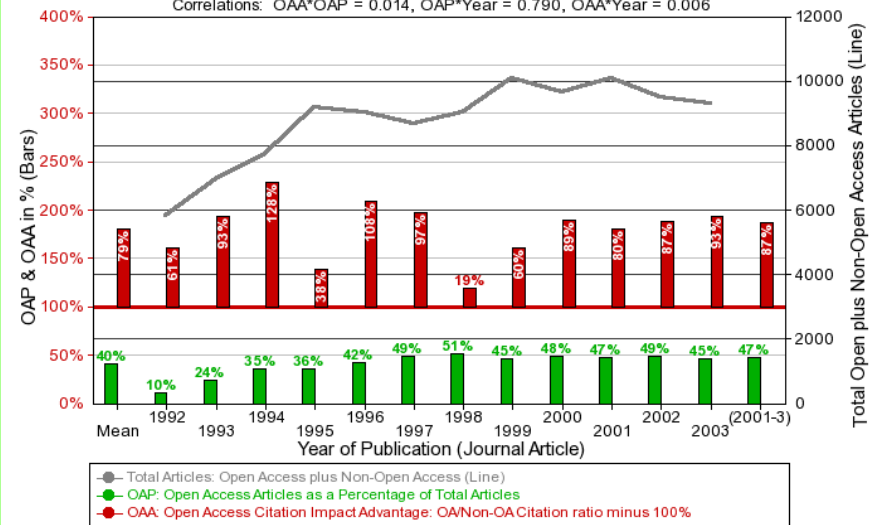
On average 20.1 journals/year (incl. self-citations) - Fri Aug 20 20:37:18 2004  
Correlations:  $OAA*OAP = 0.195$ ,  $OAP*Year = 0.993$ ,  $OAA*Year = 0.225$



## Astrophysics

## OA vs. Non-OA Citation Impact Advantage (Nuclear & Particle Physics)

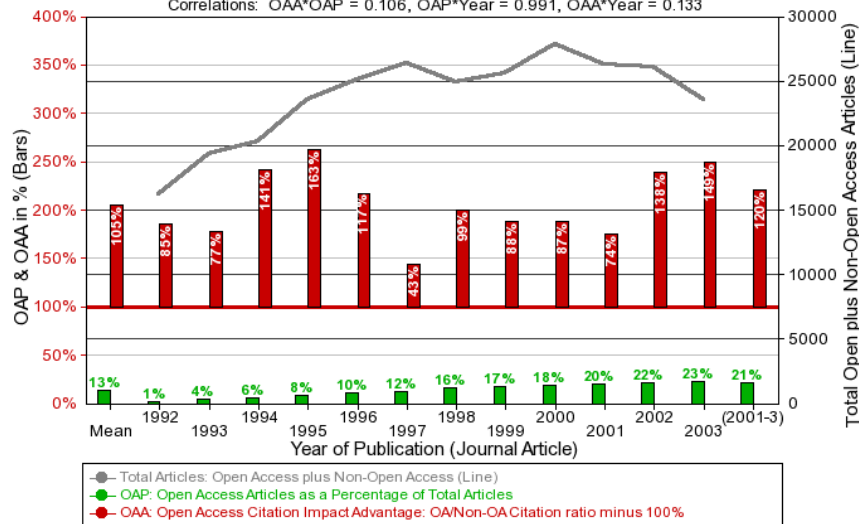
On average 15.9 journals/year (incl. self-citations) - Fri Aug 20 20:37:28 2004  
Correlations:  $OAA*OAP = 0.014$ ,  $OAP*Year = 0.790$ ,  $OAA*Year = 0.006$



## HEP/Nuclear Physics

## OA vs. Non-OA Citation Impact Advantage (General Physics)

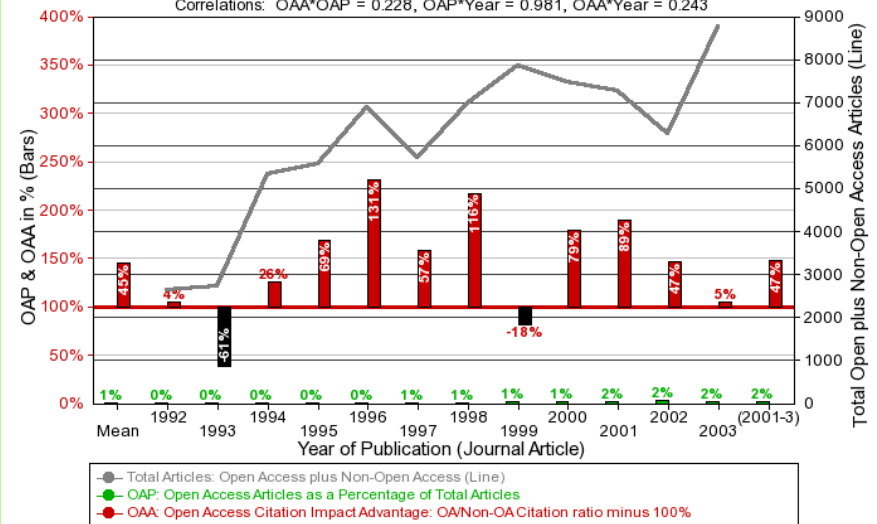
On average 65.1 journals/year (incl. self-citations) - Fri Aug 20 20:37:26 2004  
Correlations:  $OAA*OAP = 0.106$ ,  $OAP*Year = 0.991$ ,  $OAA*Year = 0.133$



## General Physics

## OA vs. Non-OA Citation Impact Advantage (Chemical Physics)

On average 8.2 journals/year (incl. self-citations) - Fri Aug 20 20:37:24 2004  
Correlations:  $OAA*OAP = 0.228$ ,  $OAP*Year = 0.981$ ,  $OAA*Year = 0.243$

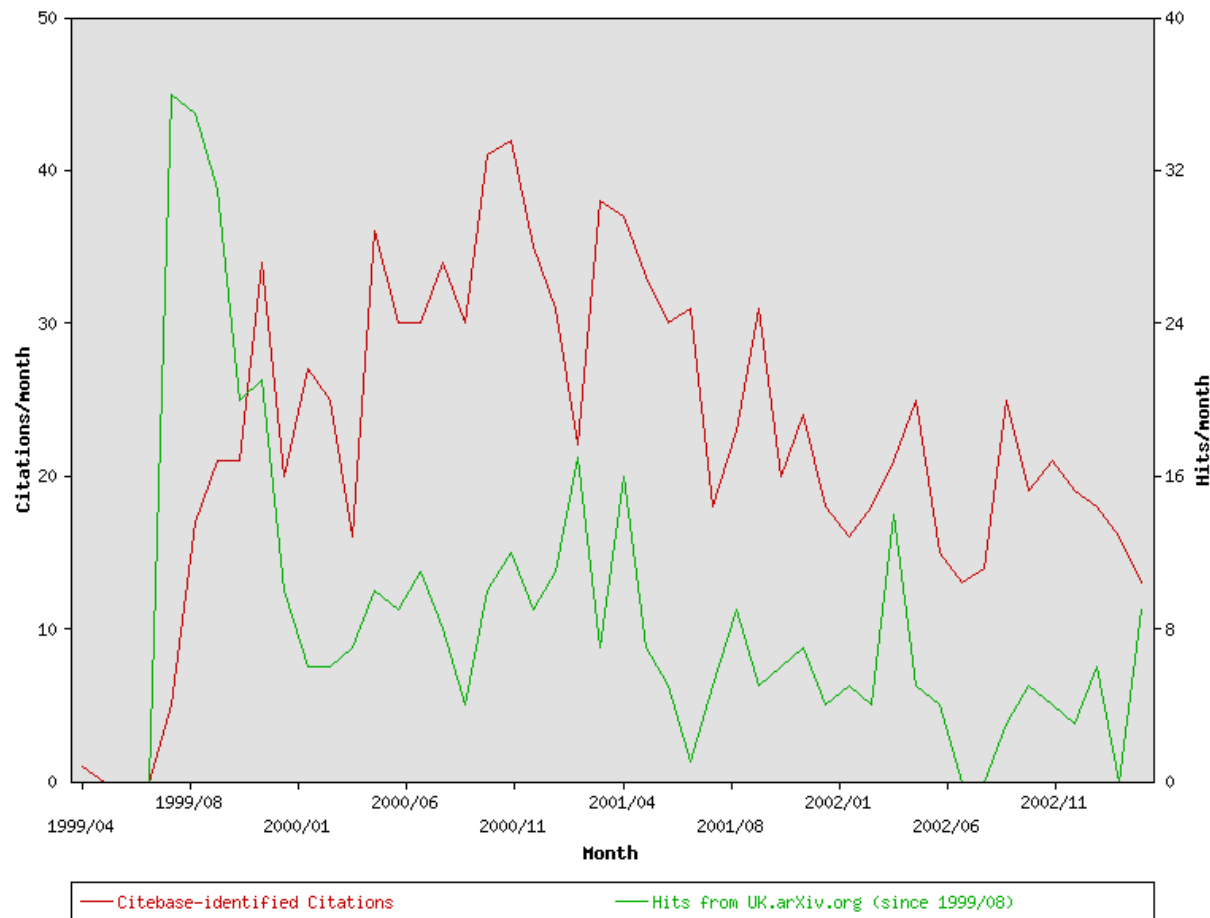


## Chemical Physics

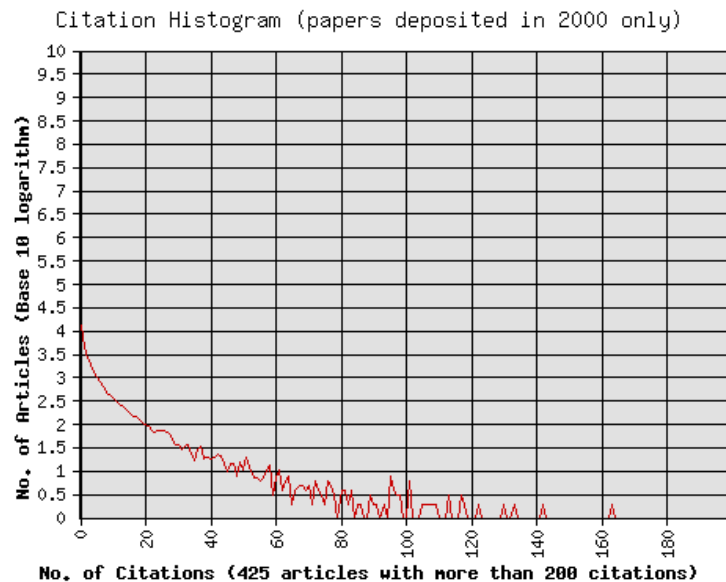


# Time-Course of Citations (red) and Usage (hits, green)

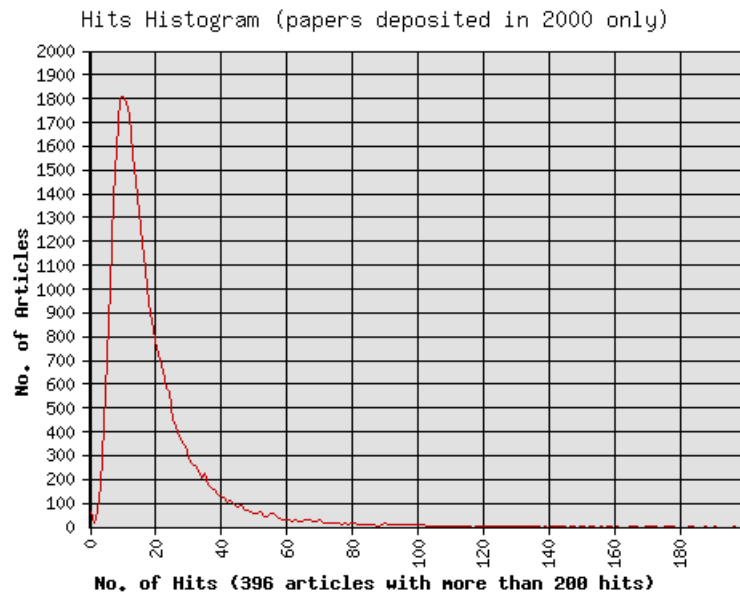
Witten, Edward (1998) String Theory and Noncommutative Geometry *Adv. Theor. Math. Phys.* 2 : 253



1. Preprint or  
Postprint appears.



Most papers are not cited at all



Average UK downloads per paper: 10  
(UK site only: 18 mirror sites in all)

## Usage Impact

is correlated with **Citation Impact**

(Physics ArXiv: hep, astro, cond, quantum; math, comp)

<http://citebase.eprints.org/analysis/correlation.php>

(Quartiles Q1 (lo) - Q4 (hi))

**All**  $r=.27$ ,  $n=219328$

Q1 (lo)  $r=.26$ ,  $n=54832$

Q2  $r=.18$ ,  $n=54832$

Q3  $r=.28$ ,  $n=54832$

**Q4 (hi)**  $r=.34$ ,  $n=54832$

**hep**  $r=.33$ ,  $n=74020$

Q1 (lo)  $r=.23$ ,  $n=18505$

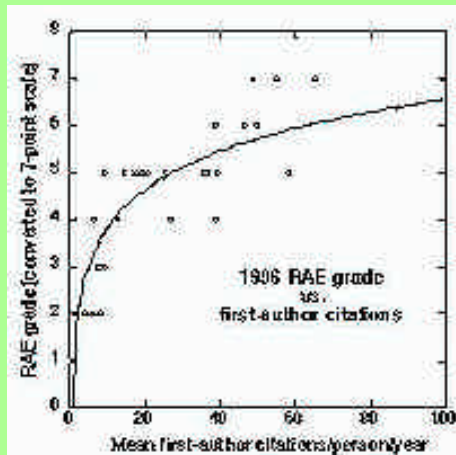
Q2  $r=.23$ ,  $n=18505$

Q3  $r=.30$ ,  $n=18505$

**Q4 (hi)**  $r=.50$ ,  $n=18505$

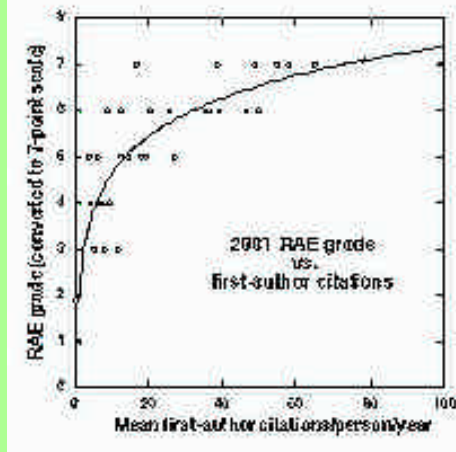
(correlation is highest for high-citation papers/authors)

# Research Assessment, Research Funding, and Citation Impact



**“Correlation between RAE ratings and mean departmental citations +0.91 (1996) +0.86 (2001) (Psychology)”**

**“RAE and citation counting measure broadly the same thing”**



**“Citation counting is both more cost-effective and more transparent”**

(Eysenck & Smith 2002)

<http://psyserver.pc.rhbnc.ac.uk/citations.pdf>

# The objective of open-access

(and the motivation that will induce researchers to provide it)

is:

- not to quarrel with, ruin or replace journals  
(at all)
- 

- nor is it to solve the budgetary problems of libraries  
(*and yet...*)
- nor is it to provide access to teachers - students - the  
general public (*and yet...*)
- nor is it to provide access to the Developing World  
(*and yet...*)

# The objective of open-access is:

to maximize research  
impact



by maximizing research  
access



# The BOAI Self-Archiving FAQ (BOAI-1)

<http://www.eprints.org/self-faq/>

<http://www.soros.org/openaccess/>





# Berlin Declaration on



## Open Access to Knowledge in the Sciences and Humanities

<http://www.zim.mpg.de/openaccess-berlin/berlindeclaration.html>

### The pertinent passages:

“Open access [means]:

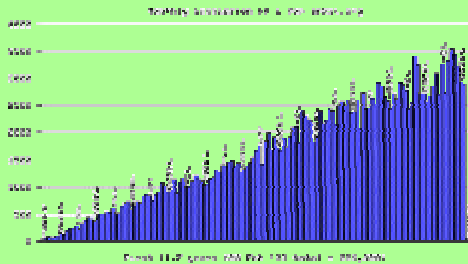
“1. free... [online, full-text] access

“2. A complete version of the [open-access] work... is deposited...  
in at least one online repository... to enable open access,  
unrestricted distribution, [OAI] interoperability, and long-term  
archiving.

“[W]e intend to... encourag[e].. our researchers/grant recipients to  
publish their work according to the principles of... open access.”

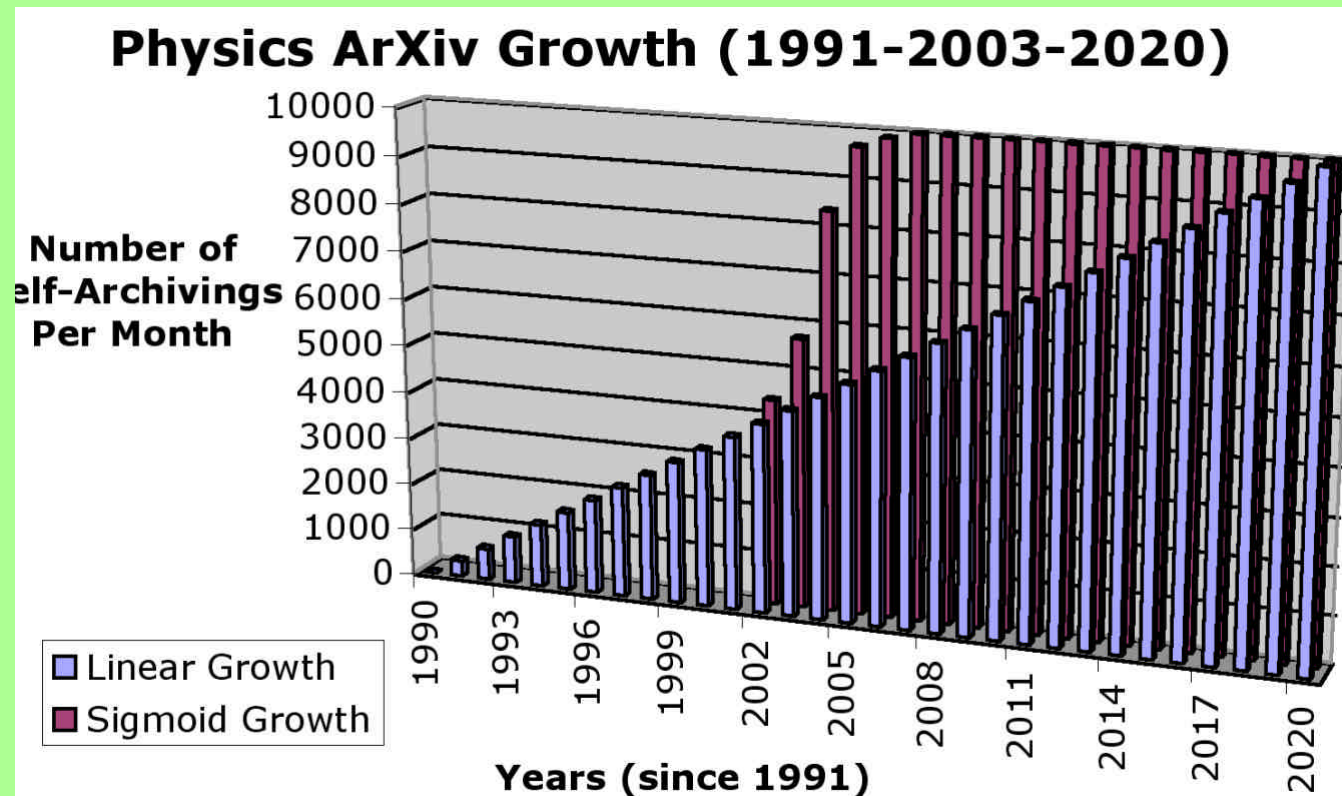


Even the fastest-growing archive, the Physics ArXiv, is still only growing linearly (since 1991):



*that year*

*2050*

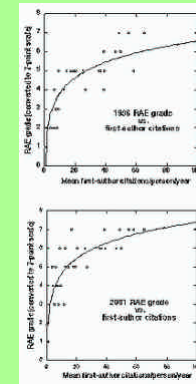
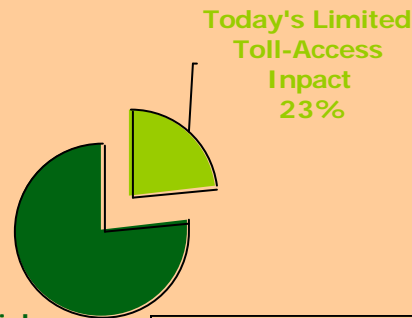




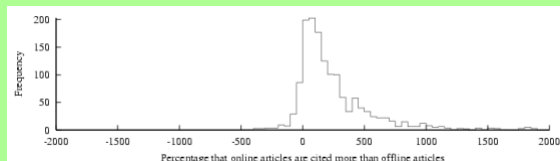
# Quo usque tandem patientia nostra...?

*How long will we go on letting our cumulative  
daily/monthly/yearly research-impact losses grow,  
now that the online medium has made it all preventable?*

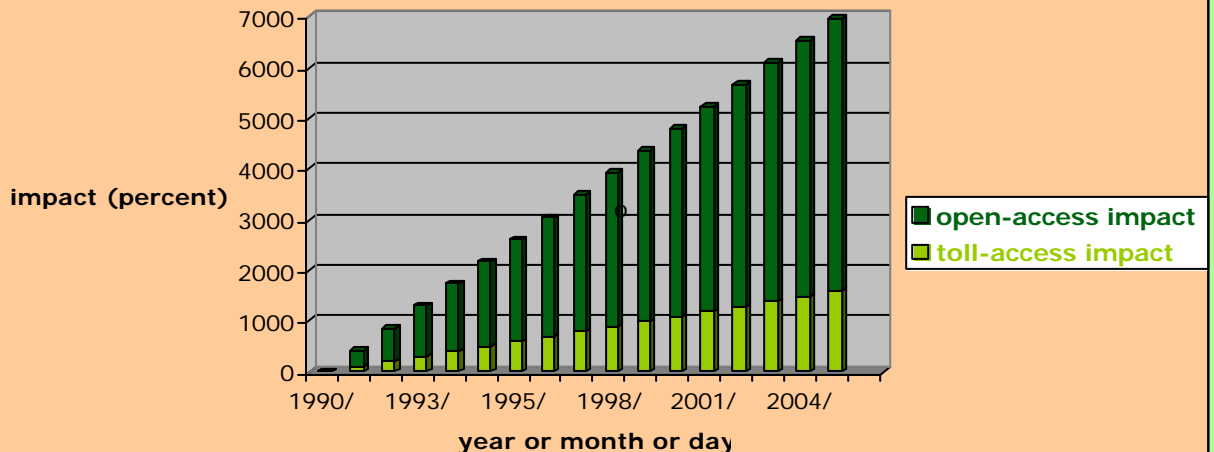
What we stand to gain:



.91  
correlation  
with UK  
research  
ranking and  
funding



## Yearly/Monthly/Daily Impact Loss



336% higher impact

## UK House of Commons Science and Technology Committee Recommendation to Mandate Institutional Self-Archiving

“This Report recommends that **all UK higher education institutions establish institutional repositories** on which their published output can be stored and from which it can be read, free of charge, online.



“It also recommends that **Research Councils and other Government Funders mandate their funded researchers to deposit a copy of all of their articles** in this way.”

## US House of Representatives Appropriations Committee Recommendation that the NIH should mandate self-archiving



“The Committee... recommends NIH develop a policy... **requiring that a complete electronic copy of any Manuscript reporting work supported by NIH grants or contracts be... [made] freely and continuously available upon acceptance of the manuscript for publication** in any scientific journal.”

## **BOAI Self-Archiving FAQ** <http://www.eprints.org/self-faq/>

### **What-is/why/how FAQs:**

[What is self-archiving?](#)

[What is the Open Archives Initiative \(OAI\)?](#)

[What is OAI-compliance?](#)

[What is an Eprint Archive?](#)

[How can I or my institution create an Eprint Archive?](#)

[How can an institution facilitate the filling of its Eprint Archives?](#)

[What is the purpose of self-archiving?](#)

[What is the difference between distributed and central self-archiving?](#)

[What is the difference between institutional and central Eprint Archives?](#)

[Who should self-archive?](#)

[What is an Eprint?](#)

[Why should one self-archive?](#)

[What should be self-archived?](#)

[Is self-archiving publication?](#)

[What about copyright?](#)

[What if my copyright transfer agreement explicitly forbids self-archiving?](#)

[Peer-review reform: Why bother with peer review?](#)

[Is self-archiving legal?](#)

[What if the publisher forbids preprint self-archiving?](#)

### **What-to-do FAQs:**

[What can researcher/authors do to facilitate self-archiving?](#)

[What can researchers' institutions do to facilitate self-archiving?](#)

[What can libraries do to facilitate self-archiving?](#)

[What can research funders do to facilitate self-archiving?](#)

[What can publishers do to facilitate self-archiving?](#)

## BOAI Self-Archiving FAQ <http://www.eprints.org/self-faq/>

### "I-worry-about..." FAQs"

- [1. Preservation](#)
- [2. Authentication](#)
- [3. Corruption](#)
- [4. Navigation \(info-glut\)](#)
- [5. Certification](#)
- [6. Evaluation](#)
- [7. Peer review](#)
- [8. Paying the piper](#)
- [9. Downsizing](#)
- [10. Copyright](#)
- [11. Plagiarism](#)
- [12. Priority](#)
- [13. Censorship](#)
- [14. Capitalism](#)
- [15. Readability](#)
- [16. Graphics](#)
- [17. Publishers' future](#)
- [18. Libraries'/Librarians' future](#)
- [19. Learned Societies' future](#)
- [20. University conspiracy](#)
- [21. Serendipity](#)
- [22. Tenure/Promotion](#)
- [23. Version control](#)
- [24. Napster](#)
- [25. Mark-up](#)
- [26. Classification](#)

Harnad, S. (1990) Scholarly Skywriting and the Prepublication Continuum of Scientific Inquiry. *Psychological Science* 1: 342 - 343 (reprinted in *Current Contents* 45: 9-13, November 11 1991). <http://cogprints.soton.ac.uk/documents/disk0/00/00/15/81/>

Harnad, S. (1994) A Subversive Proposal. In: Ann Okerson & James O'Donnell (Eds.) *Scholarly Journals at the Crossroads: A Subversive Proposal for Electronic Publishing*. Washington, DC., Association of Research Libraries, June 1995.  
<http://www.arl.org/scomm/subversive/toc.html>

Harnad, S. (2001) For Whom the Gate Tolls? How and Why to Free the Refereed Research Literature Online Through Author/Institution Self-Archiving, Now.  
<http://cogprints.soton.ac.uk/documents/disk0/00/00/16/39/>

Harnad, S., Carr, L., Brody, T. & Oppenheim, C. (2003) Mandated online RAE CVs Linked to University Eprint Archives: Improving the UK Research Assessment Exercise whilst making it cheaper and easier. *Ariadne* 35 <http://www.ariadne.ac.uk/issue35/harnad/>

Harnad, S. (2003) Electronic Preprints and Postprints. *Encyclopedia of Library and Information Science* Marcel Dekker, Inc.  
<http://www.ecs.soton.ac.uk/~harnad/Temp/eprints.htm>

Harnad, S. (2003) Online Archives for Peer-Reviewed Journal Publications. *International Encyclopedia of Library and Information Science*. John Feather & Paul Sturges (eds). Routledge. <http://www.ecs.soton.ac.uk/~harnad/Temp/archives.htm>