Astronomical Publishing: Yesterday, Today & Tomorrow

John Huchra
Harvard-Smithsonian Center for Astrophysics
Outline:

I. History
II. Why We Publish
III. Publishing Models
IV. All Things Change
V. The Future of Scientific Publishing
JPH

Chair AAS Pub Board 1986-8
AIP Publishing Policy Committee 1988-95
   Subcommittee on Journals
   on Information Technology
   on Translation Journals
PASP Editorial Board 1992-6
HBS Publishing Board 2005-7
Vice Provost for Research Policy 2005-6
History

Earliest scripts ~ 6600-3500 BCE
- China: Early Bronze Age
- Europe
- Egypt

Earliest “Records” ~ 2600 BCE
(Cuneiform + Hieroglyphs)
First Scientific “Periodicals”

Started in England & France ~ 1665

“Philosophical Transactions of the Royal Society”  
England

“Journal des Sçavans”  France

Followed by various Almanacs, especially

HM Nautical Almanac  1767 →

USNO Nautical Almanac  1852 →

There has been large growth in the number and diversity of scientific journals since the 18th century.

Currently there are over 24,000 *Refereed* Journals

and probably over 150,000 total periodicals.
Astronomical Publications

Four Major “Print” Journals + many others

Hale
1895

Six Merge
1969

Gould & Keeler
1849

Future Professional
Communication in Astronomy II
Refereed papers in 20th C

From J. Hearnshaw

April 13, 2010
Future Professional
Communication in Astronomy II
From J. Hearnshaw
Refereed papers in major journals 1990-2008

From J. Hearnshaw

Future Professional
Communication in Astronomy II
Why Do We Publish?

Primary Reason is **Information Transfer:**

SI = To “increase and diffuse knowledge”

or

AAS = “The Society, through its publications, disseminates and archives the results of astronomical research. The Society also communicates and explains our understanding of the universe to the public.”
Why Else?

Career Advancement

Credit

Employment

Tenure (?)

Grants

Awards

~ Field

Dependent

+ Location

Dependent

Sometimes cash ....
Will this Change?

Primary reason *won’t* --- for the foreseeable future we need to communicate results.

Secondary reasons might --- demographic shifts, career shifts:

1. “Tenure” changing
2. Criteria for employment changing
3. The way we do research is changing.
How do we Publish?

Publication Models

1. Primarily subscription charges (often for profit publishers but also others e.g. AIP)
2. User pays = primarily page/article charges
3. Benefactor or Single Payer (e.g. RAS)
4. Mixed Models (e.g. AAS)
5. Open Access models (often = benefactor)
Also in Traditional Models

Refereed Journals

What is the value added?

Is it worth the $$ and the time?

Personal experience --- I’ve never met a paper that couldn’t be improved by the work of an impartial, knowledgeable referee...

Challenges --- finding good referees, maintaining standards, keeping t↓ and $↓.
Ok, Why Open Access?

(forgive me, I’m from Harvard)

1. $$$ The “Journals Crisis” – or the long term extreme increases in subscription costs (10-20%/year for institutional subs)
2. $$$ Access to your (or your University’s) own research products. Think Copyright Clearance Center.
3. Speed!
4. Altruism – access for the (academic) poor.
And, Things Change

AAS Members

Growth 25% faster than US Pop
Figure O-11
Average annual growth in number of researchers in selected regions/countries/economies: 1995–2007

<table>
<thead>
<tr>
<th>Region</th>
<th>1995–2007 Growth Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. (1.4 million)</td>
<td>11%</td>
</tr>
<tr>
<td>EU (1.4 million)</td>
<td>10%</td>
</tr>
<tr>
<td>Russia (0.5 million)</td>
<td>6%</td>
</tr>
<tr>
<td>Japan (0.7 million)</td>
<td>6%</td>
</tr>
<tr>
<td>South Korea (0.2 million)</td>
<td>4%</td>
</tr>
<tr>
<td>Taiwan (0.1 million)</td>
<td>4%</td>
</tr>
<tr>
<td>China (1.4 million)</td>
<td>4%</td>
</tr>
<tr>
<td>Singapore (0.03 million)</td>
<td>2%</td>
</tr>
</tbody>
</table>

EU = European Union

NOTES: Researchers are full-time equivalents. Time span is 1996–2007 or closest available year. Number of researchers in 2007 or most recent year in parentheses. U.S. data for 2007 estimated based on 2004–06 growth rate. EU includes all 27 member states.

SOURCE: Organisation for Economic Co-operation and Development, Main Science and Technology Indicators (2009/1 and previous years); and National Science Foundation, Division of Science Resources Statistics, special tabulations.

Science and Engineering Indicators 2010
Asia

Figure O-4

Percent

EU = European Union


Science and Engineering Indicators 2010
The Rise of Asia

<table>
<thead>
<tr>
<th>Share of Total Global R&amp;D Spending</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Americas</td>
<td>39.9%</td>
<td>39.4%</td>
<td>39.2%</td>
</tr>
<tr>
<td>U.S.</td>
<td>35.4%</td>
<td>35.0%</td>
<td>34.8%</td>
</tr>
<tr>
<td>Asia</td>
<td>32.0%</td>
<td>33.5%</td>
<td>34.6%</td>
</tr>
<tr>
<td>Japan</td>
<td>13.2%</td>
<td>12.5%</td>
<td>12.3%</td>
</tr>
<tr>
<td>China</td>
<td>9.1%</td>
<td>11.1%</td>
<td>12.2%</td>
</tr>
<tr>
<td>India</td>
<td>2.4%</td>
<td>2.5%</td>
<td>2.9%</td>
</tr>
<tr>
<td>Europe</td>
<td>24.9%</td>
<td>24.0%</td>
<td>23.2%</td>
</tr>
<tr>
<td>Rest of World</td>
<td>3.2%</td>
<td>3.1%</td>
<td>3.0%</td>
</tr>
</tbody>
</table>

Source: Battelle, R&D Magazine

<table>
<thead>
<tr>
<th>China's Share of World Publications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical Category</td>
</tr>
<tr>
<td>-------------------------------------</td>
</tr>
<tr>
<td>Materials Science</td>
</tr>
<tr>
<td>Chemistry</td>
</tr>
<tr>
<td>Physics</td>
</tr>
<tr>
<td>Mathematics</td>
</tr>
<tr>
<td>Engineering</td>
</tr>
<tr>
<td>Computer Science</td>
</tr>
<tr>
<td>Geoscience</td>
</tr>
<tr>
<td>Pharmacology</td>
</tr>
<tr>
<td>Environment</td>
</tr>
<tr>
<td>Space Science</td>
</tr>
<tr>
<td>Biology</td>
</tr>
<tr>
<td>Animal Science</td>
</tr>
<tr>
<td>Agricultural Science</td>
</tr>
<tr>
<td>Microbiology</td>
</tr>
<tr>
<td>Genetics</td>
</tr>
<tr>
<td>Immunology</td>
</tr>
</tbody>
</table>

Source: Thomson Reuters

<table>
<thead>
<tr>
<th>India's Share of World Publications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical Category</td>
</tr>
<tr>
<td>-------------------------------------</td>
</tr>
<tr>
<td>Count</td>
</tr>
<tr>
<td>Chemistry</td>
</tr>
<tr>
<td>Agricultural Science</td>
</tr>
<tr>
<td>Materials Science</td>
</tr>
<tr>
<td>Pharmacology</td>
</tr>
<tr>
<td>Plant &amp; Animal Science</td>
</tr>
<tr>
<td>Physics</td>
</tr>
<tr>
<td>Engineering</td>
</tr>
<tr>
<td>Geoscience</td>
</tr>
<tr>
<td>Space Science</td>
</tr>
<tr>
<td>Microbiology</td>
</tr>
</tbody>
</table>

Source: Thomson Reuters

<table>
<thead>
<tr>
<th>Global R&amp;D Spending</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008 R&amp;D as % of GDP</td>
</tr>
<tr>
<td>---------------------</td>
</tr>
<tr>
<td>Americas</td>
</tr>
<tr>
<td>U.S.</td>
</tr>
<tr>
<td>Asia</td>
</tr>
<tr>
<td>Japan</td>
</tr>
<tr>
<td>China</td>
</tr>
<tr>
<td>India</td>
</tr>
<tr>
<td>Europe</td>
</tr>
<tr>
<td>Rest of World</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

PPI: Purchasing Power Parity
Source: Battelle, R&D Magazine

Future Professional Communication in Astronomy II

April 13, 2010
The Way We Do Science

Astronomy → Physics, especially particle physics (fortunately slowly)
Change is in the air.
Open access to 596,309 e-prints in Physics, Mathematics, Computer Science, Quantitative Biology, Quantitative Finance and Statistics

Subject search and browse: Physics Search Form Interface

5 Mar 2010: New Submission System and announcement schedule changes
21 Jan 2010: Collaborative support plan announced
8 Apr 2009: Added public author identifiers, Facebook interaction, myarticles widget, and personal Atom feeds
See cumulative "What's New" pages

Robots Beware: indiscriminate automated downloads from this site are not permitted

Physics

- Astrophysics (astro-ph new, recent, find)
  includes: Cosmology and Extragalactic Astrophysics; Earth and Planetary Astrophysics; Galaxy Astrophysics; High Energy Astrophysical Phenomena; Instrumentation and Methods for Astrophysics; Solar and Stellar Astrophysics
ArXiv:

Growing almost linear with time, total astro-pubs = 108,557 + 12,631 X-r

April 12, 2010
Even the Way We Access Information ---

Amazon Kindle

Apple IPAD

CHAPTER ONE
THE LIGHT-BEAM RIDER

“I promise you four papers,” the young patient examiner wrote his friend. The letter would turn out to be some of the most significant tidings in the history of science, but its importance was marked by no initial sign that was typical of his author. He had, after all, just addressed his friend as “you frozen whale” and apologized for writing a letter that was “inconsequential balder.” Only when he got around to describing the papers, which he had produced during his spare time, did he give some...
And People

My Son
My Students
My Postdocs

Digital Natives are connected 24/7.
Open Access is Growing

> 4,700 Certified Open Access Journals

(Directory of Open Access Journals, Lund University Libraries)

Chronicle
Feb 19, '10
Open Access & the University

What is driving the University (and other) communities?

1. $$$
   The cost of buying reprints for classes
   The cost/difficulty of simple “fair use” reproductions (e.g. this talk)
   Library subscriptions to expensive (often for profit) journals

→ driven hard by the economic downturn
Open Access and the “Law”

Congress & The Administration & the Judiciary are of two minds:

1. Intellectual Property rights (patents, copyright) → proprietary use of material to gain $$, competitive advantage

2. Free access to taxpayer paid information to gain $$, competitive advantage

We could get the worst of both worlds!
The Future

So where do we go from here?

Drivers are

New ways of communicating
Changes in the way we work
Changes in the world
Changes in resources available

and perhaps legal questions
Future Solutions

Remember 1. Why are we publishing?

2. Who are the users?

JPH’s guesses

1. There will be an increasing move towards open access and very rapid publication.

“Tenure” based on only refereed publications will pass, especially as more astronomers are employed outside major research universities.

There are already major articles only on ArXiv.

Disclaimer: I’m married to an economist....
Future Solutions

2. Publishers will need to move towards mixed business models with page or article charges. This is not as crazy as you might think as we are moderately close to a single payer model now, either through page charges or through overhead supported library subscriptions.

3. Publishers should also identify “value added” components for their journals --- e.g. full text searches, completely linked cross references, curation of data included in publications. Good scientific practice!
Future Solutions

→ Individual authors are not capable of archiving either their papers or their data.
→ Universities lack the expertise (and will) to do this for all fields

4. Publishers should continually work to identify new ways of providing services to their users. The Competitive Advantage.

The **Digital Natives** are coming, it's only a matter of time! (and perhaps we should learn Chinese...
The Astrophysical Tweet?

Tweets emerge as a serious business tool

By D.C. Denison

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet?

The Astrophysical Tweet??