

# Universities and the Ecology of Scholarly Publication

R. Michael Tanner, Provost  
University of Illinois at Chicago  
Nakata Lecture, April 2005

# Overview

- Information Technology and Infrastructure
- Entertainment Industry
- Actors in the Ecology
- Life Process of a Journal Article
- Economics of Publication
- Challenges and New Models

# Information Technology and Infrastructure

## Assertions:

- Information technology has fundamentally changed “publication,” the means for disseminating and accessing information and images, and will soon supplant printed media in the vast majority of fields and usages.
- The technology advances that accelerate this transition will continue for the foreseeable future. Scholarly publication will continue to piggy-back on much larger investments driven by other business and government sectors.

## Information Technology and Infrastructure (2)

- **Computational Power**

The price/performance of computation follows an exponential curve of improvement.

“Moore’s law”: The observation made in 1965 by Gordon Moore, co-founder of Intel, that the number of transistors per square inch on integrated circuits had doubled every year since the integrated circuit was invented. Moore predicted that this trend would continue for the foreseeable future. [[www.webopedia.com/TERM/M/Moores\\_Law.html](http://www.webopedia.com/TERM/M/Moores_Law.html)]

A state-of-the-art personal computer costs \$3,000, 1985 to 2005, capabilities grow exponentially.

Impact => On-the-fly typesetting, file compression and decompression, data presentation, Javascripts, etc.

## Information Technology and Infrastructure (3)

- **Communications**

Massive investments in the 1990s by the government and the telecommunication industry in support of telephony and the Internet make the marginal cost of transmitting “normal” files (1MByte) close to zero.

- Long-haul fiber optics
- Data rates now reaching 10 Gb/sec.
- LANs and WANs
- Cable modem and DSL
- Wi-Fi

## Information Technology and Infrastructure (4)

- **High Resolution Displays**

Critical for the acceptance of screen displays in lieu of printed materials. Pixels and color accuracy matter, especially in graphic-intensive fields!

Major advances and scaling up of manufacture has dropped the price: e. g., thin film transistor active-matrix liquid crystal display, 1680 x 1050 pixels          \$1,300

- **Printers**

Color inkjet printers

- **Proof** that the resolution and color accuracy have crossed the acceptance threshold: **Digital cameras.**

## Information Technology and Infrastructure (5)

- **Storage/Retrieval Media**

Storage densities in magnetic media continue to follow another version of Moore's law.

50 Gbyte hard drives in laptops.

Flash memory drives - Career writings on a watch fob.

- **Archiving Media**

DVDs for data

**Remember, advances in the capacity to generate, transmit, and store files simply expand the need for additional resources.**

**Assertion: Convenience and flexibility of digital media will triumph!**

# Entertainment Industry

## Assertions:

- The entertainment industry dwarfs scholarly publication as a force behind assimilation of information technology.
- Copyright law and the tilt of the battleground for content producers, distributors, and consumers are being heavily influenced by the entertainment industry. (E.g., the Digital Millennium Copyright Act, copyright extension, Recording Industry Association of America lawsuits.)

## Entertainment (2): A sense of scale

- **Television Revenues** (U.S. 2002, Plunkett Research)
  - **Broadcast** **\$37.0B**
  - **Cable, Pay-per-view** **\$80.5B**
- **Recorded Music Revenues** **\$9.1B**
- **Film** (U.S. 2003, Plunkett Research/Price Waterhouse)
  - **Box Office Receipts** **\$9.3B**
  - **Premium TV royalties** **\$10.4B**
- – **DVD/VHS rental and sales at retail** **\$28B**

- **US Book Publishing** (U.S. '02, Assoc. Amer. Publ.) **\$26.9B**
- **Reed Elsevier global revenues** (2003) **£4.925B ~\$8.9B**
- – **Reed Elsevier profit** (Web prospectus) **£1.01B ~\$1.8B**

# Ecology of Scholarly Publication

## **Assertion:**

- A system of interactions that had long been relatively stable and sustainable has proven ripe for invasion by new predatory actors.

## Actors and Motivations

**Faculty:** Advance field; Establish reputation; Gain tenure; Enhance Income; Awards

**Univ. Libraries:**  
Provide access; Enhance collection & standing; Satisfy patrons

**Universities:**  
Hire and promote high quality researchers and teachers; attract students

**Prof. Jnl. Editors:**  
Quality, Visibility, Standing

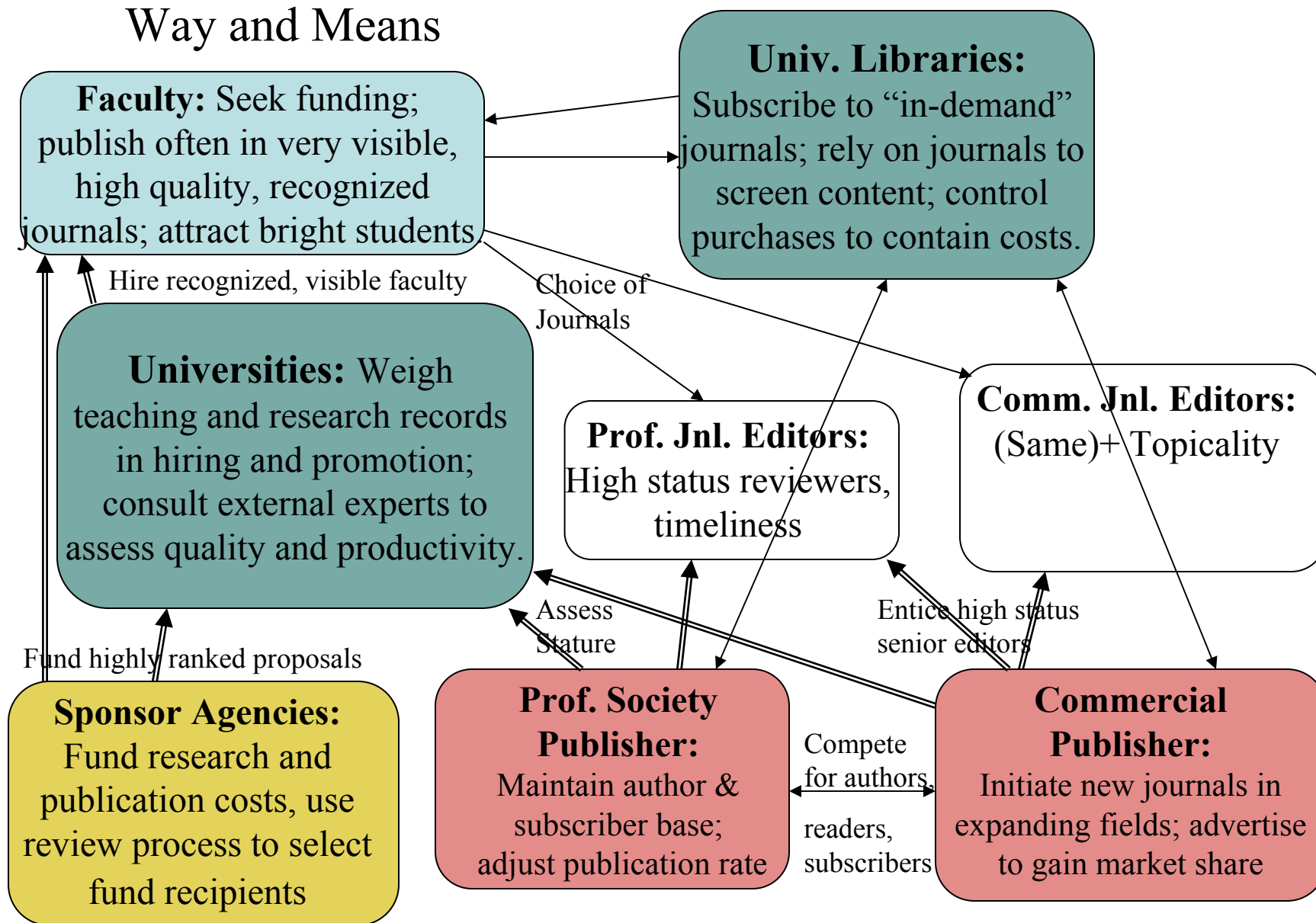
**Comm. Jnl. Editors:**  
Quality, Visibility, Standing, Readership, Sales

**Sponsor Agencies:**  
Promote research; enhance impact and visibility of investment

**Prof. Society Publisher:**  
Enhance field, outlet for authors, foster inquiry

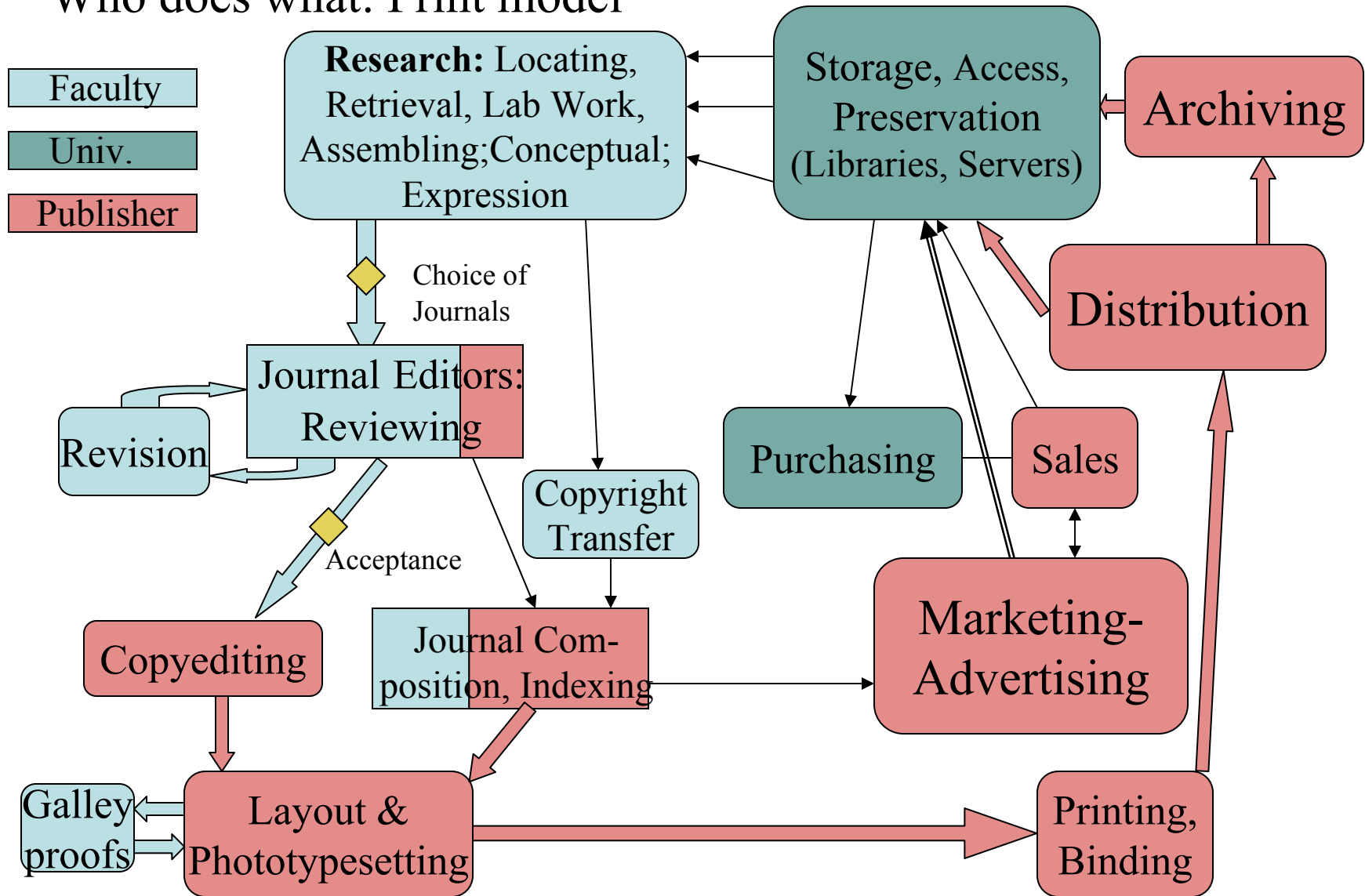
**Commercial Publisher:**  
Those plus Market Share, Brand Status, Gross Revenue, Profit Margin

# Way and Means

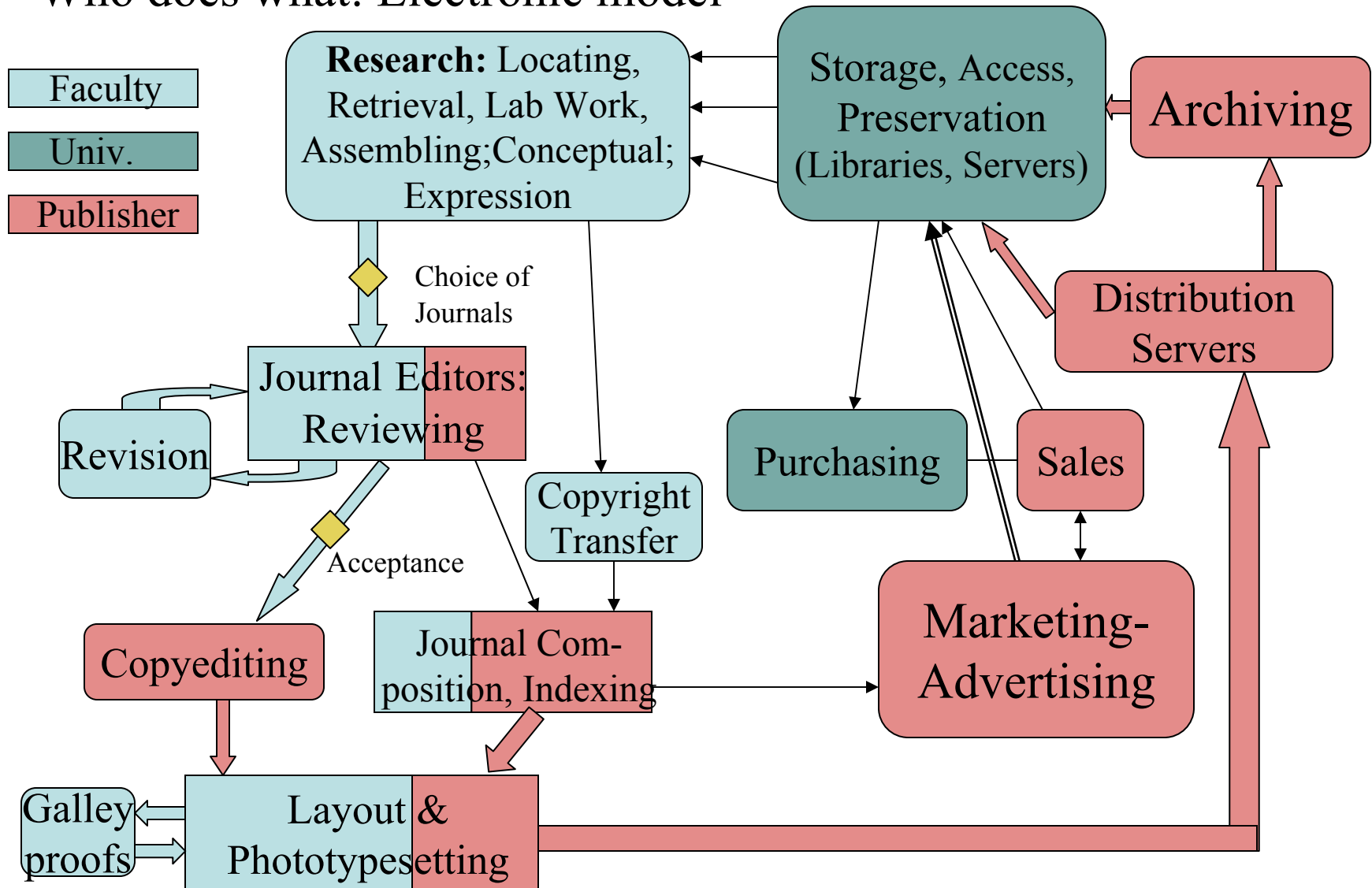




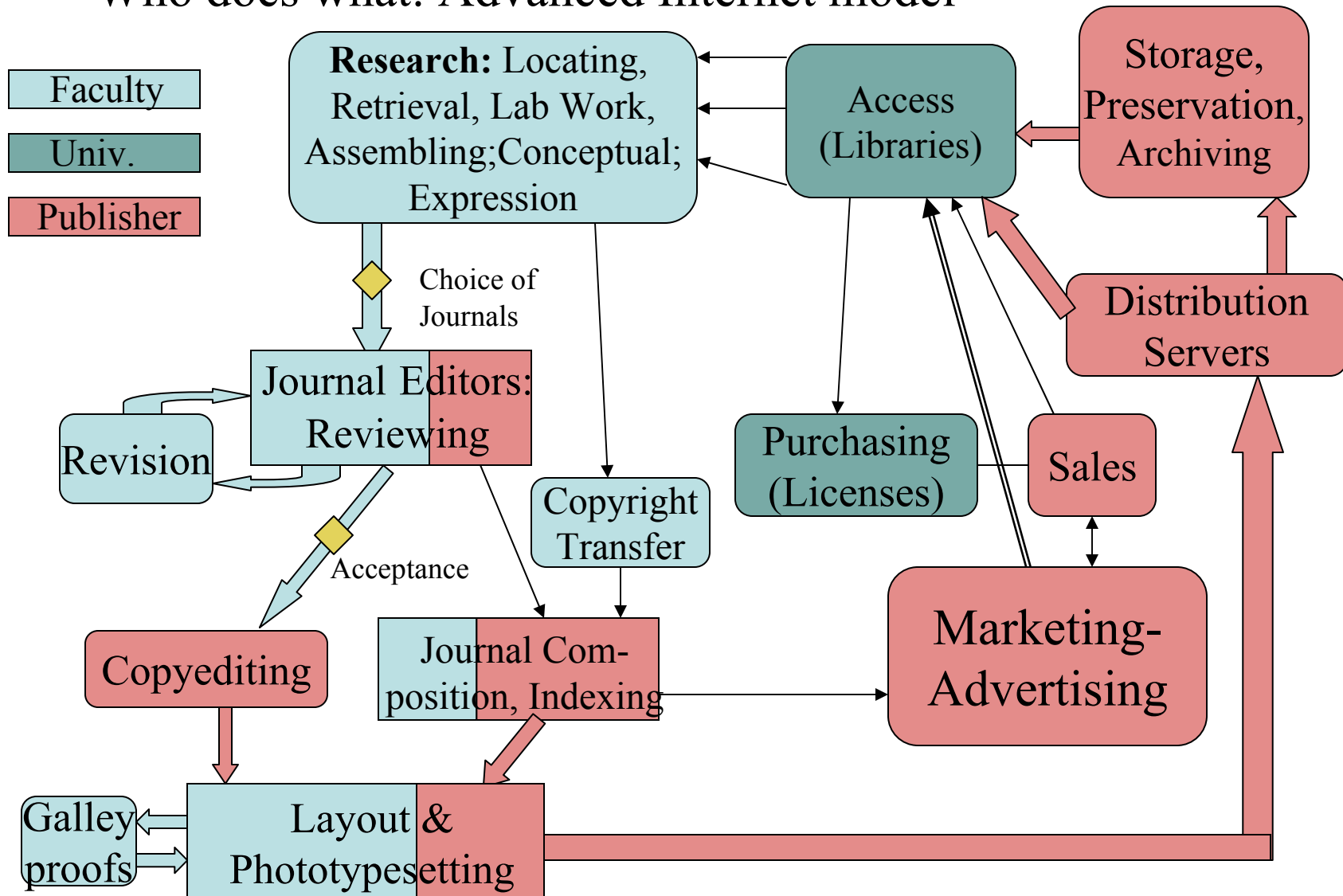
# Who does what: Print model



# Who does what: Electronic model



# Who does what: Advanced Internet model



## Value Added (for whom?)

**Research:** Innovation,  
creation of “intellectual  
property”

**Libraries:**  
Ease of Access,  
Selection, Guidance

**Archiving:**  
Assures  
indefinite  
access

**Editing & Reviewing:**  
Improve quality, screen  
and filter, winnow to  
reduce volume

**Distribution:**  
Assures widespread  
availability

**Composition:**  
Format, Context,  
Organization

**Marketing:**  
Enhances the impact of  
intellectual property,  
creates community

**Copyediting, Layout, Etc.:**  
Legibility, Ease of Use, Accuracy

# Trends in Scientific, Technical, Medical Publishing

- Peer review continues to be highly valued
- Mergers and acquisitions result in fewer giant publishers – 50% of STM journals published by 20 largest publishers
- Declining circulations, fewer individuals, libraries are increasingly the market
- Growth in number of journals leveling off but size of existing journals has grown to compensate (was doubling every 15 months)
- Publication/production costs increasing due to growth in size of issues and investments in online technologies; print subscription revenues declining
- Library consortia increasingly important in purchasing decisions

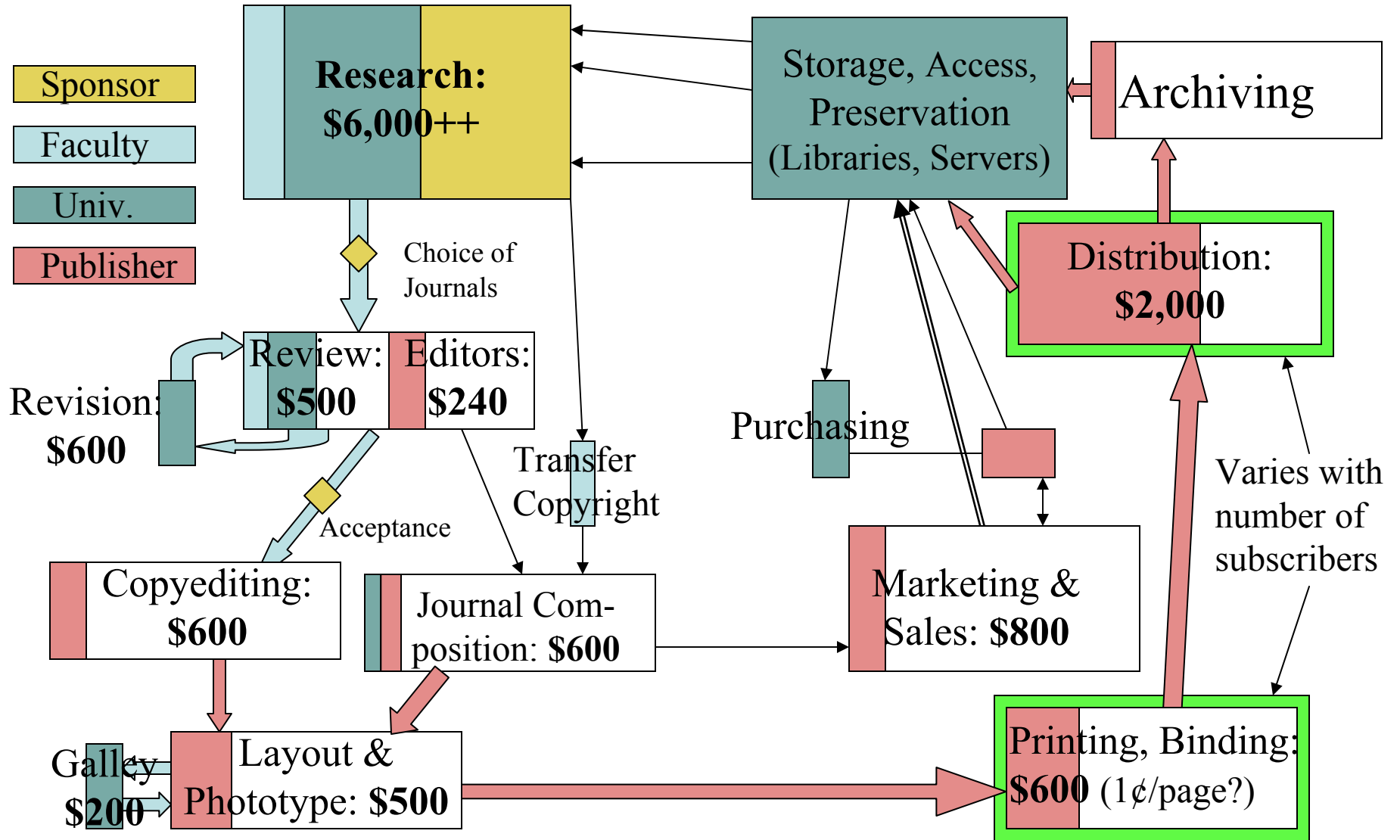
J. Hurd, from M. Keller (2003), NAS Symposium on Electronic STM Publishing (2003), BioOne survey (2003), Wellcome Trust report (2003)

# Economics of publication

- Absent market anomalies, what would be a fair market cost/price for each process step?

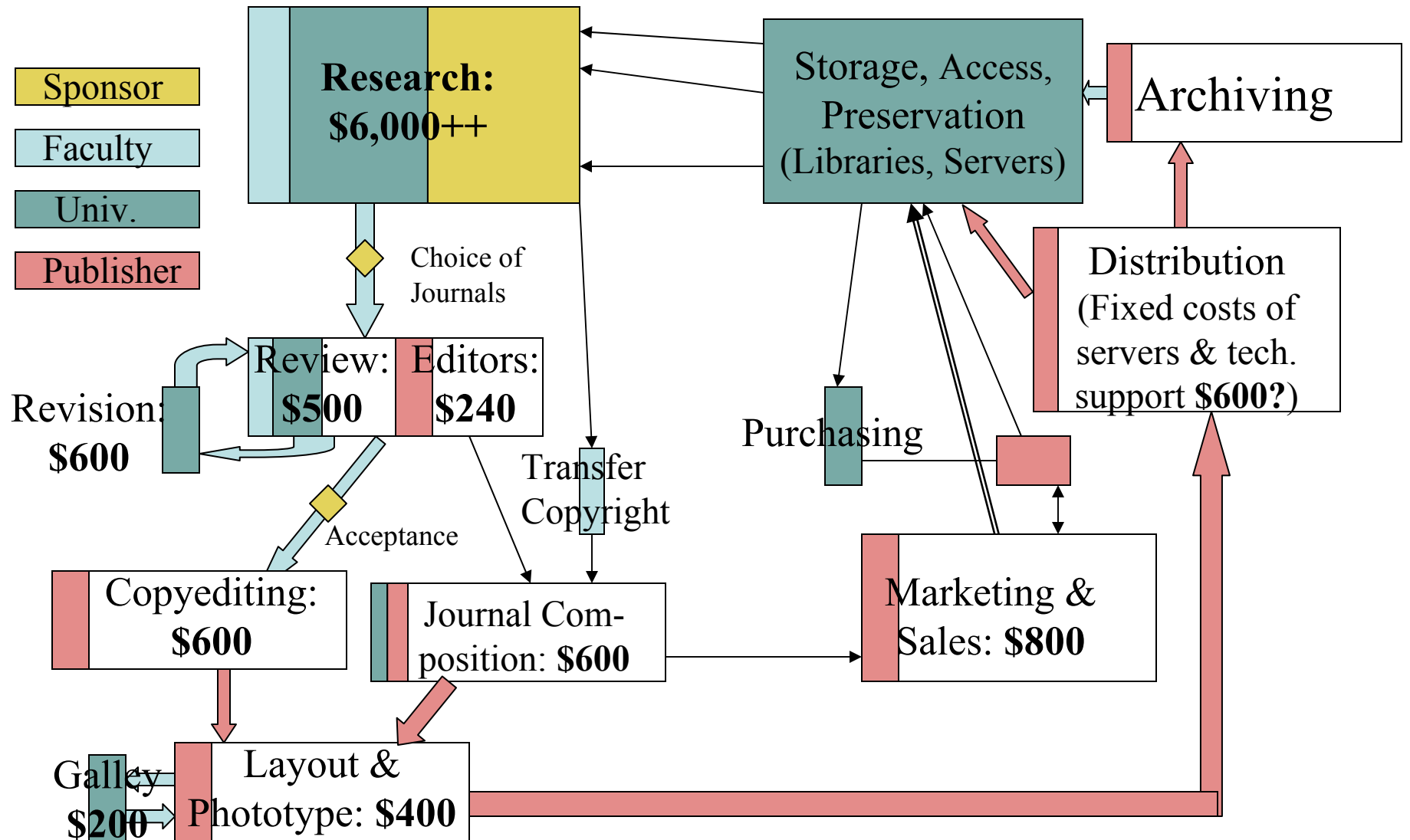
Rough estimates for costs based on “average” journal with subscription of 6,000. Cost per article are difficult to ascribe when many components are fixed costs, independent of readership.

# Cost contributions: Print model



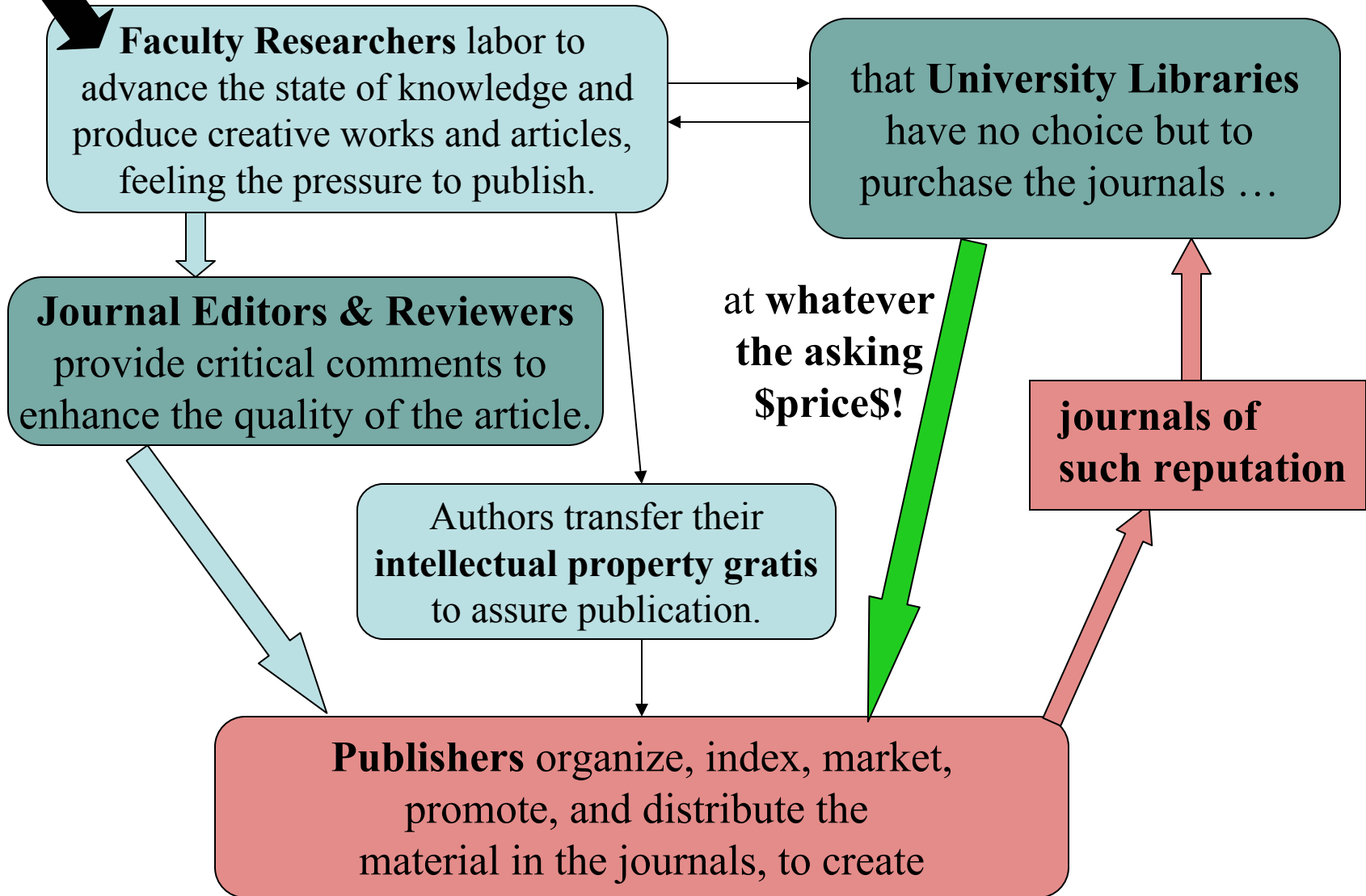
6,000 Subscribers 10 pp./article

# Cost contributions: Electronic Internet model



6,000 Subscribers 10 pp./article

# The Critical Ruinous Cycle



## Challenges (Assertions)

- Retain copyright in possession of the principal generators and funders of the process.
  - Overcome the faculty perception that any change is a take-away.
  - Protect faculty from career threat within our existing culture.
- Establish high status alternative electronic journals.
  - Create new governance structures and business models.
  - Recruit outstanding senior editors and boards.
  - Establish brands, in the face of long history and potential aggressive and well-financed competition.

# New Models

Who has an interest in the success of the publication process?  
Who stands to benefit and why? Who can reap a profit and why? How can the “value added” contributions be supported?

- Author Pays
  - The content may be of lasting value for the scholarly record, but the immediate audience is small and unwilling to pay.
  - Creation and dissemination of content is treated as a public good. (E.g., NIH 12 month recommendation)
- User/Reader Pays
  - Standard subscription
  - On-line pay-per-access (e.g., iTunes)