



# **Exploring the impacts of enhanced access to publicly funded research**

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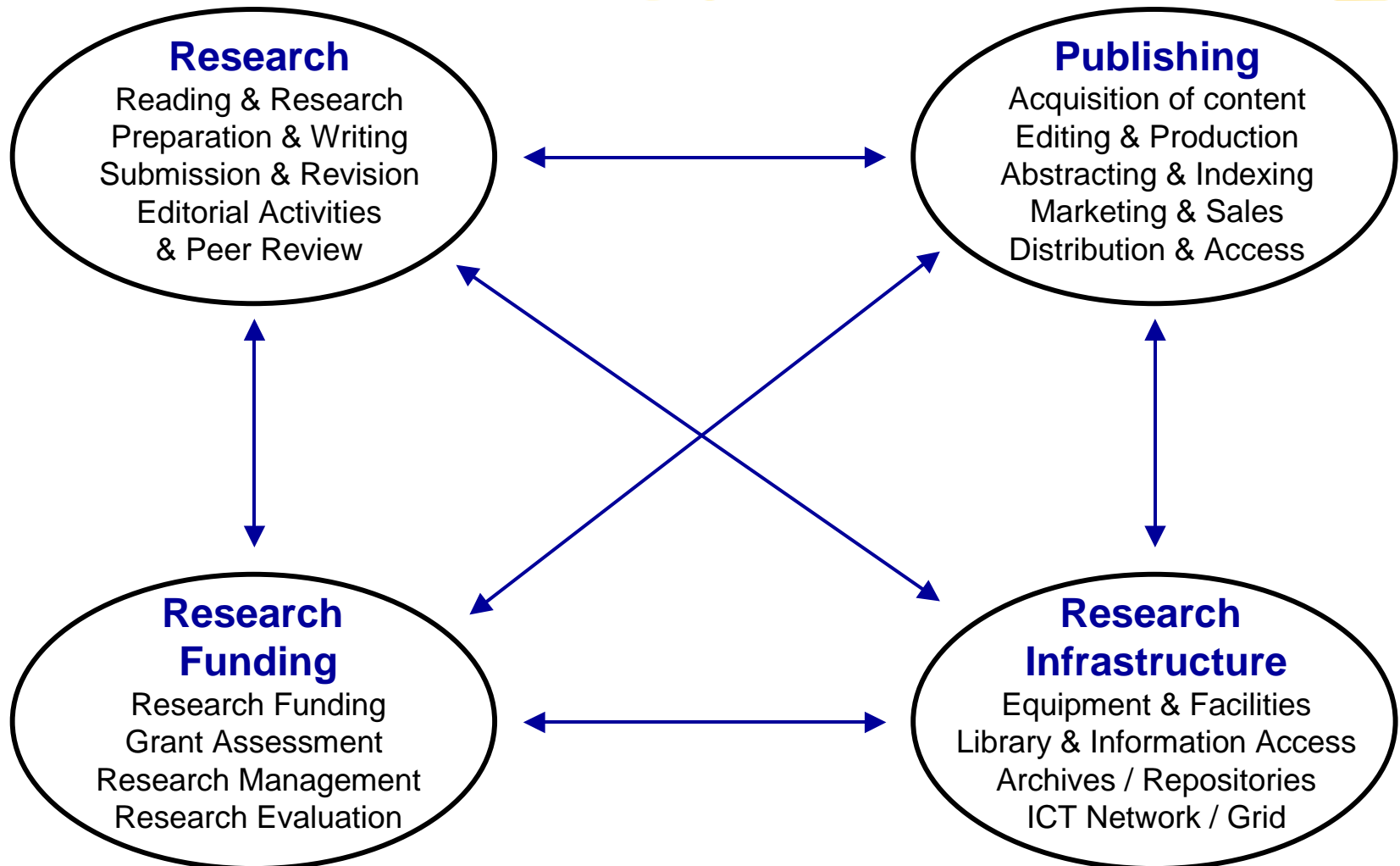
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# Project goals and audience

- Project aims were to explore and where possible measure: the costs associated with research communication, and the potential benefits of enhanced access to research results; and to compare the costs and benefits of alternative access systems.
- The project was funded by the Australian Department of Education, Science and Training, as an input to government policy on Open Access (*e.g.* The Research Quality and Accessibility Frameworks).
- It was also aimed at funding agencies and universities, as an input to their access policies and as a guide to the budgetary implications of various alternatives.

Houghton, J.W., Steele, C. & Sheehan, P.J. (2006) *Research Communication Costs in Australia: Emerging Opportunities and Benefits*, Department of Education, Science & Training: Canberra (<http://dspace.anu.edu.au/handle/1885/44485>).

# Systems perspective on costs



# Cost model and matrix approach

- The bulk of the costs associated with research communication relate to people's time.
- To convert time to dollars we used a model for full cost recovery that included salary, on-costs and overhead costs typical in universities.
- Scholarly communication is multi-dimensional, so we adopted a "matrix" approach to costing: activities, actors, objects, functions and applications.
- With the aim of being able to break down and re-assemble the scholarly communication value chain along any of these dimensions.
- We produced upper and lower bound "range" estimates, and the ranges were often large.

# Mean activity cost estimates for Higher Education, 2005 (AUD)

- Reading: academic staff ≈\$5.8 billion, published staff ≈\$3 billion pa.
- Writing (HERDC publications only) ≈ \$636 million pa.
- Peer review (scaled to HERDC) ≈ \$132 million pa.
- Editorial activities (scaled to published staff) ≈ \$36 million pa.
- Editorial board activities (scaled to published staff) ≈ \$3.8 million pa.
- Preparing grant applications (ARC & NHMRC) ≈ \$110 million pa.
- Reviewing grant applications (ARC & NHMRC) ≈ \$26 million pa.
- Publisher costs (scaled to HERDC) ≈ \$164 million pa.
- Library acquisition costs (CAUL) ≈ \$199 million pa.
- Library non-acquisition costs (CAUL) ≈ \$321 million pa.
- Cost per download (sample of CAUL subscriptions) \$3.51 (mean).
- ICT infrastructure (estimated total expenditure) ≈ \$1 billion pa.
- Sum of core activities ≈ \$4 billion (≈ 30% of HE expenditure).

# Matrix cost comparisons

- Our matrix approach supported costing for **objects** (*e.g.* production of journal articles cost an average \$21,000), and **actors** (*e.g.* writing HERDC publications cost ANU \$50 million).
- We estimated that attributable *publisher* costs relating ANU's output of HERDC publications amounted to \$14 million, while its library acquisitions expenditure was \$7.3 million.
- Whereas, nationally, higher education *publisher* costs amounted to \$165 million, while CAUL library acquisitions expenditure was \$199 million (a margin approximating the operating margin of commercial scientific publishers).

# An Impacts Framework

## RESEARCH

Access for all, research participation based on merit, not means.

### **Potential benefits:**

Speeding up discovery.  
Reduction of duplicative research.  
Fewer blind alleys.  
New research possibilities.  
Better educational outcomes & enhanced research capabilities.

## SOCIETY

Access as needed, informed consumers (e.g. health and education).

### **Potential benefits:**

Contribution to the 'informed citizen' and 'informed consumer', with implications for better use of health and education services, better consumption choices, etc. leading to greater welfare benefits.

## INDUSTRY/GOVT

(1) Access as needed, more innovative producers & informed policy.

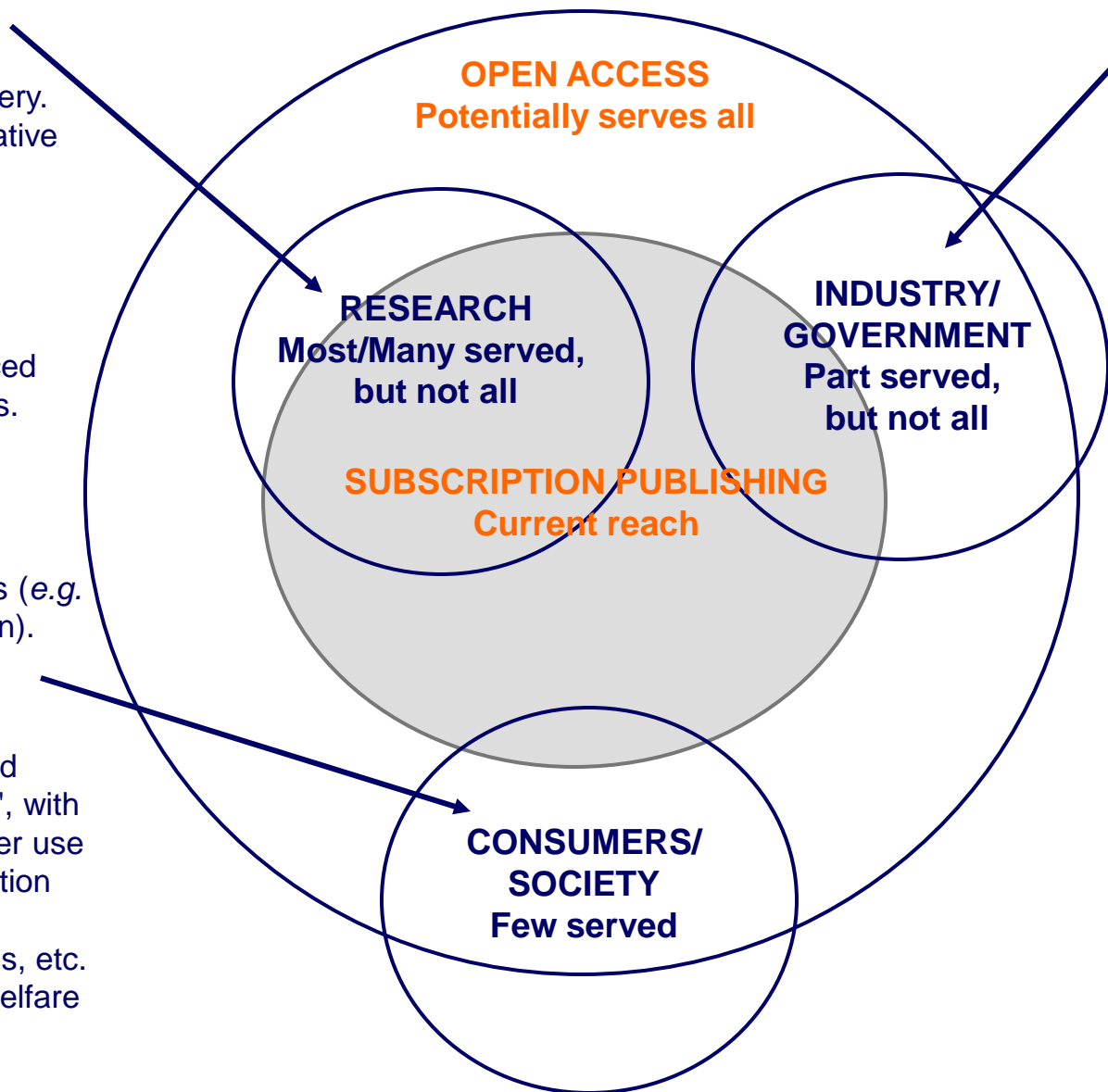
(2) New businesses add value to content (e.g. Weather Derivatives).

### **Potential benefits:**

Accelerate and widen opportunities for collaboration, commercialisation & adoption.

The potential for much wider access for GPs/nurses, teachers/students, and small firms in consulting, engineering, ICT, nanotechnology, biotechnology, etc.

The potential for the emergence of new industries based upon the open access content.



# One approach to measuring impacts: A modified Solow-Swan model

- There is a vast literature on returns to R&D, which while varied shows that social returns to R&D are high – typically 30% to 60% a year.
- The standard approach assumes that all R&D generates useful knowledge (efficiency) and all knowledge is equally accessible (accessibility), which is unrealistic.
- We introduced “accessibility” and “efficiency” into a standard model as negative, friction variables, and looked at the impact of reducing the friction by increasing access and efficiency.



# Impact estimation assumptions

- We calculated the annual gain in returns to R&D for a given level of research expenditure, across a range of rates of return, for given percentage changes in both “access” and “efficiency”.
- We looked at rates of return of 25% to 75%, and increases in access and efficiency of 1% to 10% (and used 25% and 5% as examples).
- To keep it simple we assumed:
  - The increase in both access and efficiency is the same;
  - That a move to OA has no *net* impact on the rates of accumulation and obsolescence of the stock of knowledge; and
  - That the information to which access is provided is discoverable.

# Impact estimation ranges

## Example of estimation tables (HERD, AUDm)

Higher Education 4,283	Rate of return to R&D				
	25%	40%	50%	60%	75%
Per cent change in accessibility and efficiency	Recurring annual gain from move to open access (AUD million)				
1%	22	34	43	52	65
2%	43	69	87	104	130
5%	110	176	220	263	329
10%	225	360	450	540	675

# Estimating potential impacts of OA

- With government R&D funding at \$6.5 billion a year and a 25% return, a 5% increase in access and efficiency would be worth \$166 million pa.
- With higher education R&D expenditure at \$4.3 billion and a 25% return, a 5% increase in access and efficiency would be worth \$110 million pa.
- With RC competitive grants funding to HE at \$830 million and a 25% return, a 5% increase in access and efficiency would be worth \$21 million pa.
- These are recurring annual gains from one year's R&D expenditure.

# Comparing cost and benefits

- We compare the estimated incremental cost of institutional repositories in HE with the potential incremental benefits from enhanced access to HE research (*ceteris paribus*).
- Over 20 years, a national system of institutional repositories costing \$10 million a year would cost around \$130 million (NPV), whereas:
  - Enhanced access to HE research, with impacts at \$110 million a year, would realise benefits of around \$4.8 billion (a benefit/cost ratio of 37).
  - Enhanced access to RC competitive grants funded HE research, with impacts at \$21 million a year, would realise benefits of around \$925 million (a benefit/cost ratio of 7).

# Assessment, use and lessons

- Many weaknesses and limitations, but strength in simplicity.
- Should be supplemented by detailed studies of impacts in specific cases (See the Easi-OA Research Agenda at <http://www.cfses.com/projects/Easi-OA.htm>).
- Impact estimates likely to be conservative, as critiques focus on dimensions not included in the traditional approach.
- Applies to any outputs of research (publications, data, etc.).
- Has potential for development and refinement, and may be more widely applicable to PSI.
- Has been influential in access policy in Australia, and current work includes extending the analysis in Europe.

# Background and references

- Houghton, J.W., Steele, C. and Sheehan, P.J. (2006) *Research Communication Costs in Australia: Emerging Opportunities and Benefits*, Department of Education, Science & Training: Canberra (<http://dspace.anu.edu.au/handle/1885/44485>).
- Houghton, J.W. and Sheehan, P.J. (2006) *The Economic Impact of Enhanced Access to Research Findings*, CSES Working Paper No.23, Victoria University: Melbourne (<http://www.cfses.com/documents/wp23.pdf>).
- The Economic and Social Impacts of Open Access (Easi-OA) Research Agenda (<http://www.cfses.com/projects/Easi-OA.htm>).