

Kosten-Nutzen-Analyse alternativer Publikationsmodelle

Ergebnisse des Houghton-Reports für Deutschland

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DFG-Projekte zu OA in Frankfurt

Zeitraum	Titel	Ziele
2001 - 2004	<i>Perspektiven für den Bezug elektronischer Informationsressourcen in Deutschland</i>	<ul style="list-style-type: none"> • Bewertung der Bezugsstrukturen in Deutschland • Empfehlungen für künftige Bezugs- und Bereitstellungspraxis (v. a. Konsortien)
2005 - 2008	<i>Wiss. Informationsversorgung und alternative Preisbildungsmechanismen (WIAP)</i>	<ul style="list-style-type: none"> • Evaluierung von Preisbildungsmechanismen bei wissenschaftlichen Zeitschriften • Bewertung von Open Access aus Sicht der Marktteilnehmer • Identifizierung effizienter Marktmechanismen
Seit 06/2009	<i>Economic Implications of New Models for Information Supply for Science and Research in Germany</i>	<ul style="list-style-type: none"> • Umfrage zur Akzeptanz von Selbstarchivierung • Identifizierung aller im wissenschaftlichen Informationsprozess auftretenden Kosten • Einbezug von Open-Access-Modellen und NLP u.a. Houghton-Studie für Deutschland



Agenda

1 Hintergrund: Houghton Report

2 Vorgehensweise und Datenerhebung

3 Ergebnisse

4 Diskussion



Studien von John Houghton et al.

Ziel:

- Bewertung und Vergleich alternativer Publikationsmodelle anhand der Kosten und des Nutzens

Methodik:

- Basiert auf einem sehr detaillierten **Prozessmodell wissenschaftlicher Forschung und Kommunikation** von Björk (2007)
- **Schätzung der Kosten** für alle diese Aktivitäten – abhängig vom Publikationsmodell fallen diese unterschiedlich aus
- Nutzenbewertung der Modelle anhand eines modifizierten **Solow-Swan-Modells**, welches den jeweiligen Einfluss auf die “returns to R&D” misst

Historie:

- Houghton Reports für Australien, UK, Dänemark, Niederlande
- Ergebnis in allen Ländern: „OA ist sinnvoll“



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1

Hintergrund: Houghton Report

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Houghton Report für Deutschland

Vorgehensweise:

- 1.) Identifikation aller Prozesse des wissenschaftlichen Publikationskreislaufs
- 2.) Quantifizierung der Kosten für verschiedene Publikationsmodelle
- 3.) Quantifizierung des Nutzens für die Modelle
- 4.) Kosten/Nutzen-Vergleich der Modelle anhand der
 - direkt mit einem Modell assoziierten Kosten
 - indirekten systemweiten Kosten und Einsparungen
 - Benefits aus erhöhten Einnahmen bei F&E



Houghton Report für Deutschland

Analysierte Publikationsmodelle:

- Traditionelles Subskriptionsmodell als Ausgangsbasis
- OA Publishing (Golden OA)
- Selbstarchivierung mit Beibehaltung Subskriptionen (Green OA)
- Selbstarchivierung mit Overlay Services (auch: “Deconstructed Journal Model”, Smith 1999/2005)
- Nationallizenzenprogramm (NLP)



Prozesse und Datenquellen

1) Forschungsförderung

- Berichte von **Forschungsförderorganisationen** (DFG, Humboldt-Stiftung, BMBF, Volkswagenstiftung, Thyssen-Stiftung, Robert-Bosch-Stiftung, DAAD, BMWI...)
- Zahlen zu **F&E-Ausgaben** und **Beschäftigten** (EuroStat, OECD, Stat. Bundesamt...)
- Berichte zu Aktivitäten von **Forschungsinstitutionen** (Universitäten, Fraunhofer, Helmholtz-Gemeinschaft, Leibniz-Gemeinschaft, Max-Planck-Gesellschaft...)

2) Durchführung der Forschung und Kommunikation der Ergebnisse

- **Gehaltszahlen** (EuroStat...)
- **Publikationszahlen** (Web of Knowledge, SCOPUS, UK Research Assessment Exercise...)
- **Aktivitäten der Forscher** (Literaturquellen wie z. B. Tenopir, King et al. (2000, 2002, 2007, 2009), Rowlands und Nicholas (2005), Houghton et al. (2006), Björk et al. (2008))



Prozesse und Datenquellen

3) Publikation wissenschaftlicher und akademischer Arbeiten

- **Globale Daten zu STM Publishing** (EPS/Outsell, Web of Knowledge, SCOPUS, Ulrich's, The Publishers Association, Björk *et al.* (2008)…)
- **Prozesskosten Journal-Publishing** (Tenopir and King (2000, …), the ALPSP, CEPA (2008), Waltham (2005; 2006)) und **Book-Publishing** (Clark (2001, 2008), Watkinson (2001), …)

4) Unterstützung von Verbreitung, Retrieval und Speicherung

- **Bibliotheksdaten für Deutschland** (Deutsche Bibliotheksstatistik, int. Studien wie Swan *et al.* (2010), Schonfeld *et al.* (2004))
- **NLP, Archivierung, Kosten pro Artikel** (UB Frankfurt, int. Studien, NIH, ArXiv)

5) Lesen der Publikationen und Anwendung des Wissens

- Schätzung anhand des Ertragszuwachses bei F&E durch verbesserten Access (siehe Nutzenbetrachtung)



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> Kosten



Geschätzte jährliche nationale Kosten für wissenschaftliche Aktivitäten (EUR, 2008)

German National	Estimate
Reading (Published Staff)	7,677,100,000
Writing (WoK based estimate, scaled)	2,429,700,00
Peer Review (Scaled to publication counts)	293,100,000
Editorial activities (Scaled to published staff)	177,800,000
Editorial board activities (Scaled to published staff)	19,700,000
Preparing Grant Applications (major funding agencies)	385,400,000
Reviewing Grant Applications (major funding agencies)	44,800,000
Publisher Costs (Scaled to publication counts)	675,900,000
Total National System	11,703,500,000



Geschätzte jährliche Kosten für wissenschaftliche Aktivitäten in Hochschulen und öffentl. Einrichtungen (EUR, 2008)

German Universities and Public Institutions (NLP)	Estimate
Reading (Published Staff)	6,301,400,000
Writing (WoK based estimate, scaled)	2,383,300,000
Peer Review (Scaled to publication counts)	291,300,000
Editorial activities (Scaled to published staff)	141,400,000
Editorial board activities (Scaled to published staff)	15,600,000
Preparing Grant Applications (major funding agencies)	329,800,000
Reviewing Grant Applications (major funding agencies)	38,400,000
Publisher Costs (Scaled to publication counts)	668,200,000
Total Higher Education and Public Institutions System	10,169,400,000



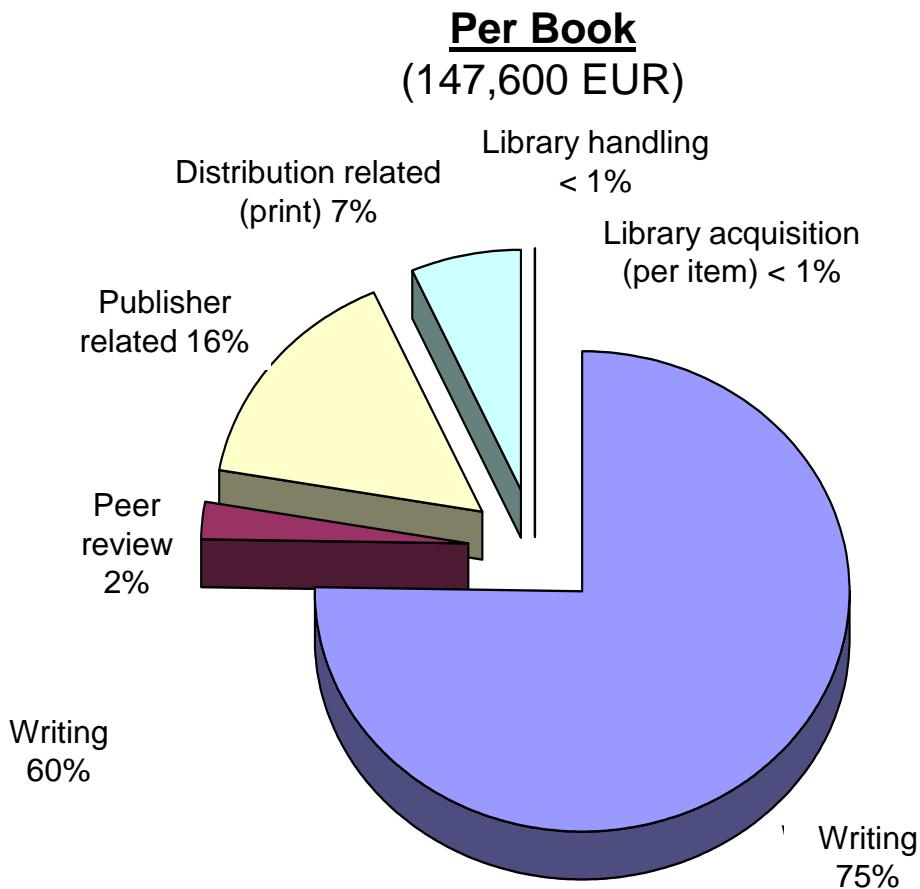
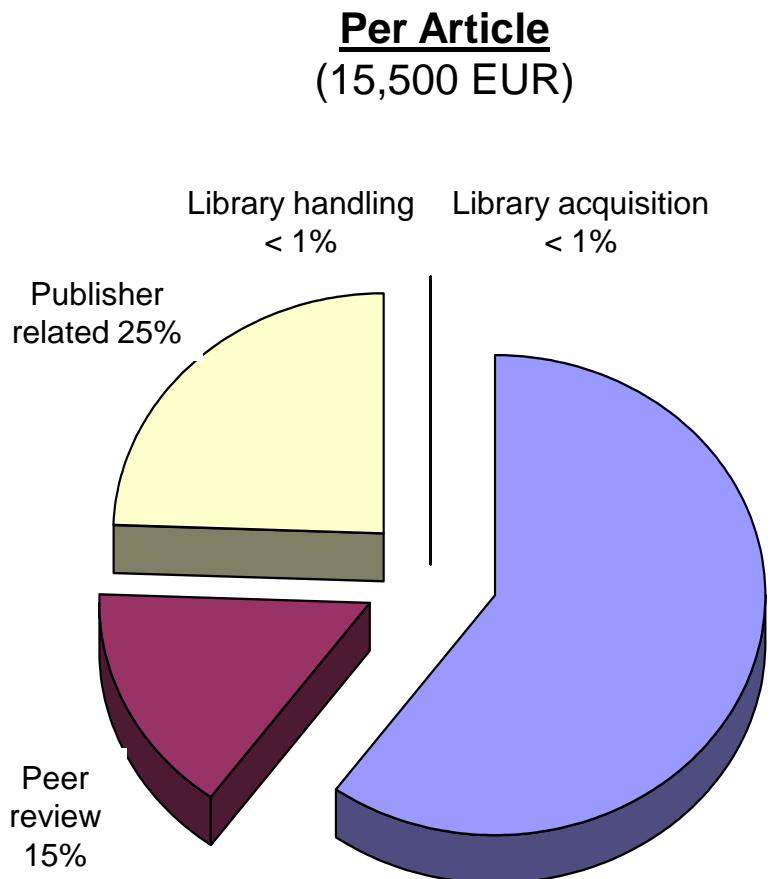
Direkte Kosten der alternativen Modelle (EUR, 2008)

German Universities and Public Institutions (NLP)	Estimate
Reading (Published Staff) Subscription or toll access publishing	
Library Acquisition (Wissensch. Universal- und Hochschulbibliotheken)	319,434,600
Estimated library non-Acquisition (Wissenschaftliche Universal- und Hochschulbibliotheken)*	640,000,000
Open access publishing & self-archiving	
Author-pays fees for journal articles produced	184,142,400
Estimated Repository Costs	43,163,000
National Licensing Program	
NLP Acquisition	13,059,000
NLP non-Acquisition (including hosting)	23,721,000

Note: * Library non-acquisition costs are estimated at approximately double acquisition costs.

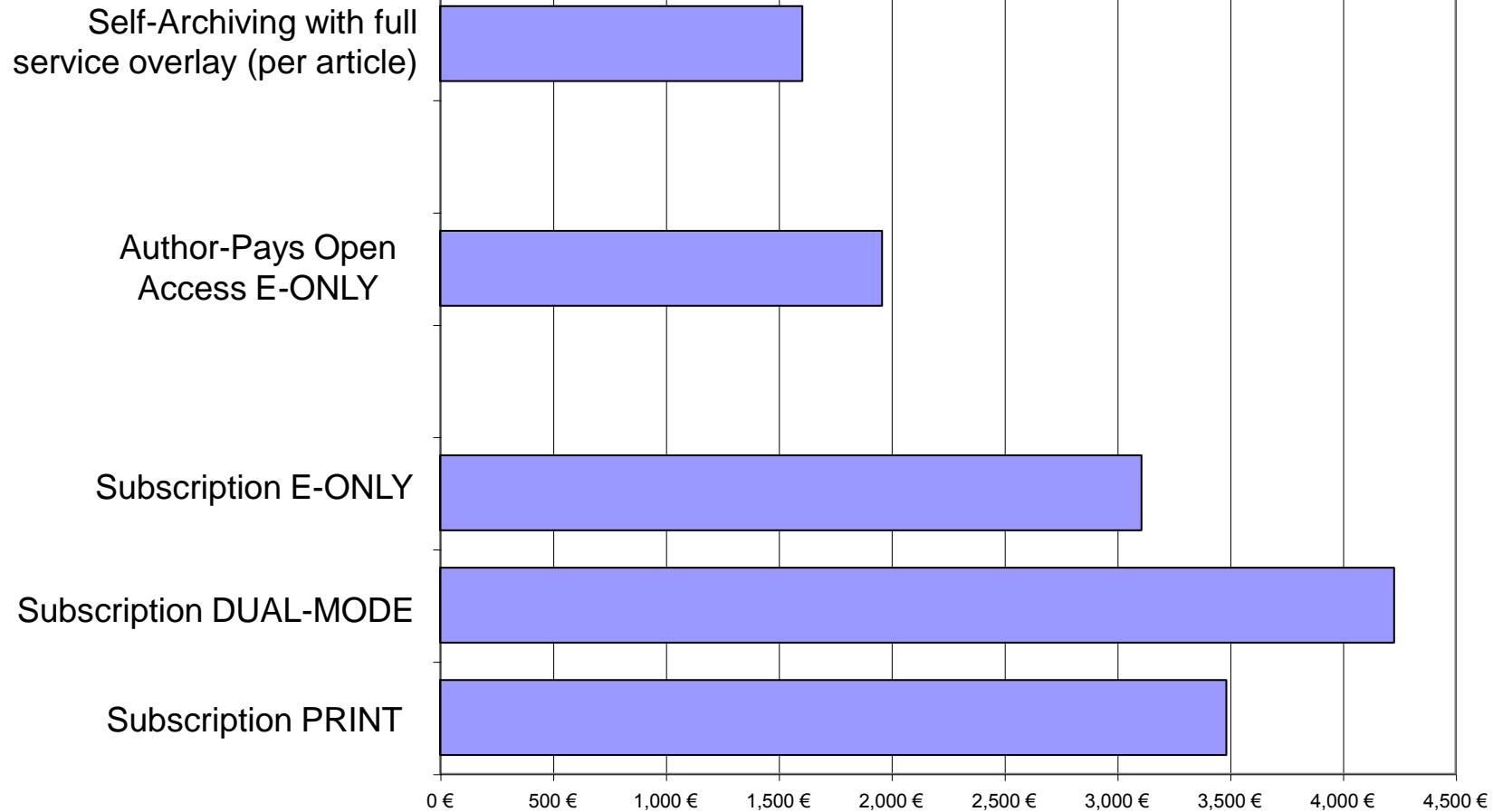


Zusammensetzung Kosten pro Item (Artikel oder Buch)





Geschätzte Verlagskosten pro Artikel nach Format und Modell (EUR, 2008)



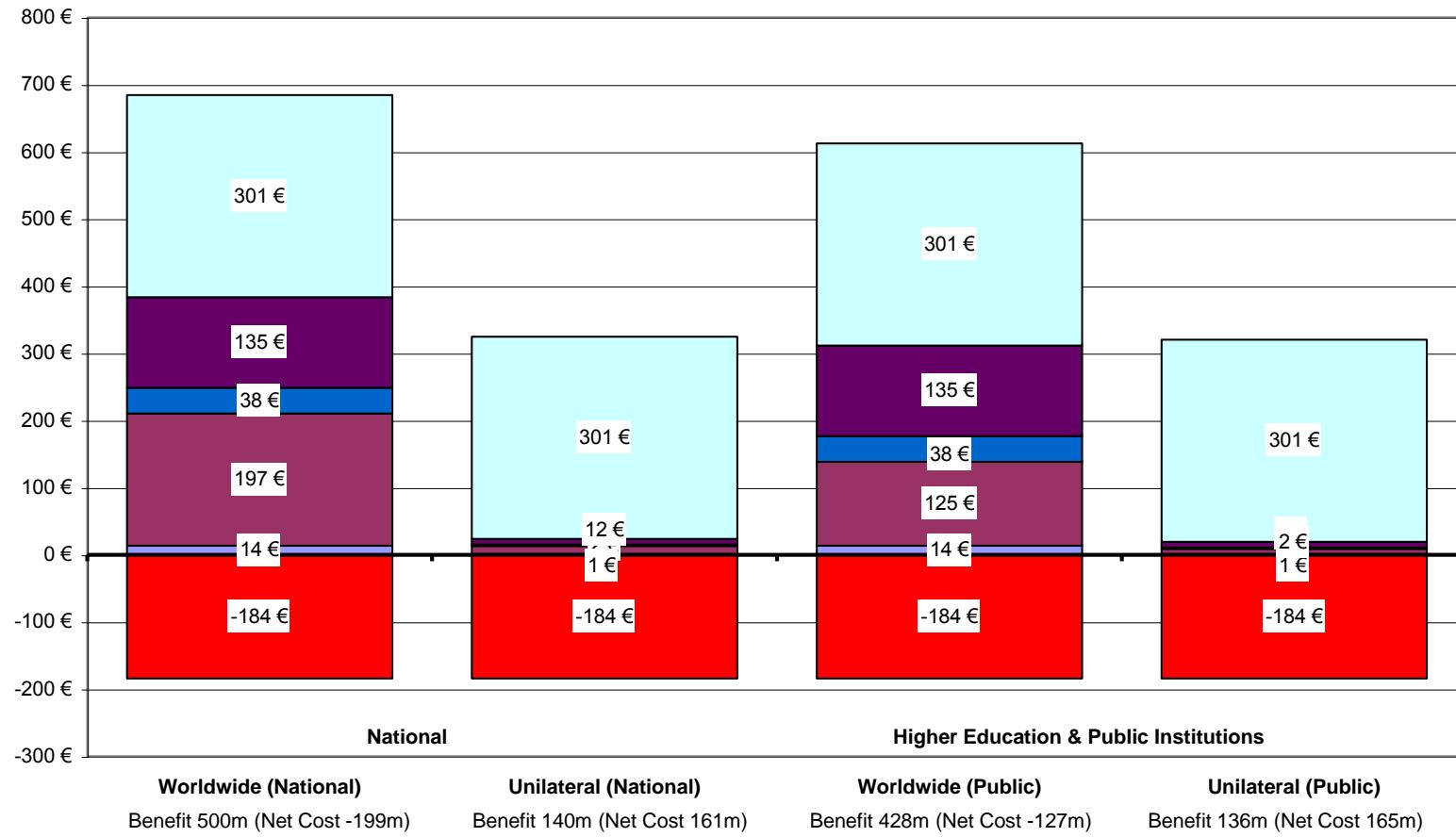
Note: These costs exclude the external costs of peer review and VAT. Overlay services include operating peer review management, editing, proofing and hosting, with commercial margins.



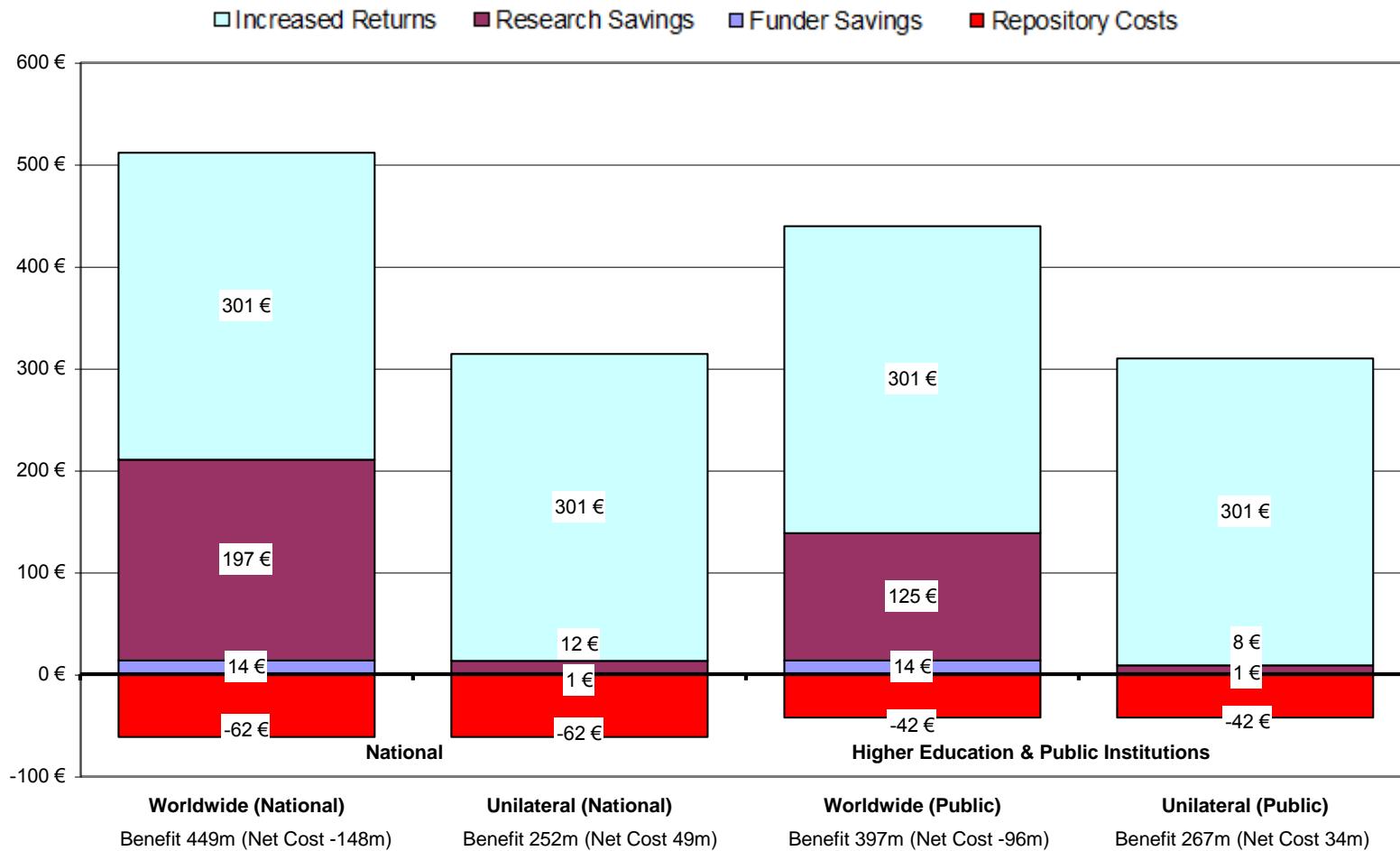
> Nutzen/Kosten-Vergleich
der Modelle

Impact of “Gold OA” publishing (EUR millions per annum, 2008)

□ Increased Returns ■ Subscription Cost Savings ■ Library Savings ■ Research Savings ■ Funder Savings ■ Author Fees

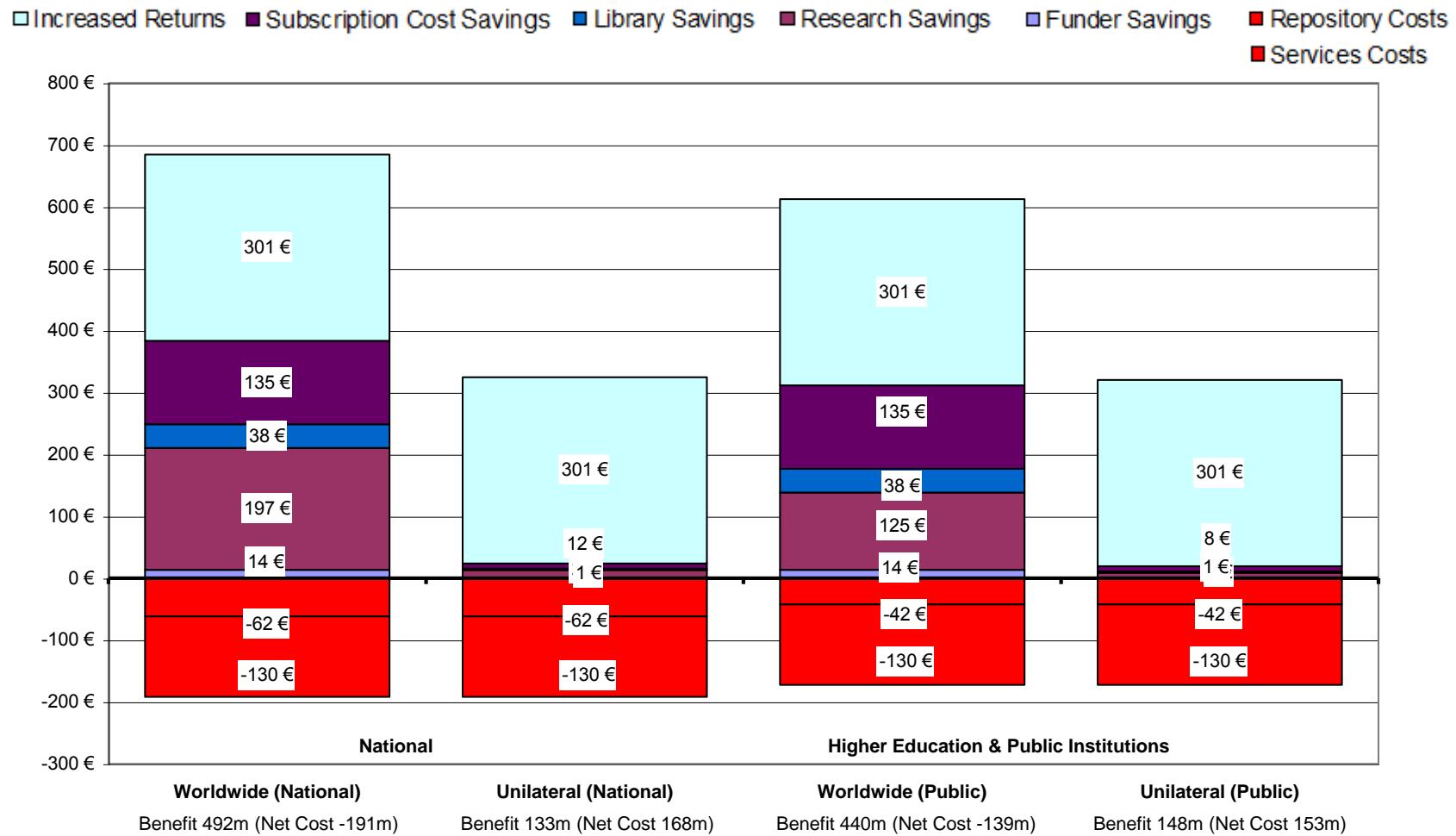


Impact of “Green OA” self-archiving (EUR millions per annum, 2008)

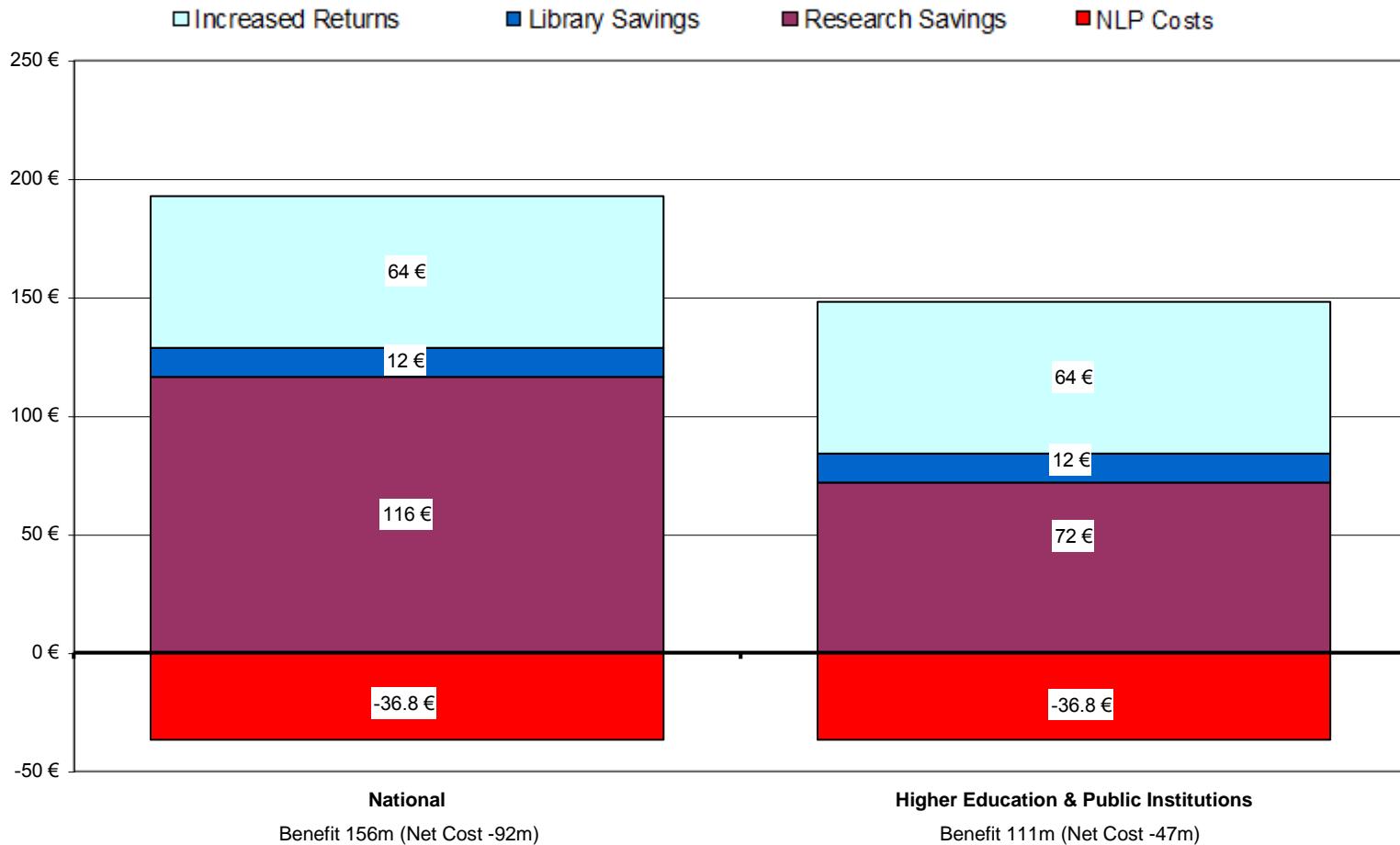




Impact of OA self-archiving with overlay production and peer review services (EUR millions per annum, 2008)



Impact of the NLP (EUR millions per annum, 2008)



Übergangsmodell: Nutzen/Kosten-Vergleich nach Szenario (Mio EUR über 20 Jahre und benefit/cost ratio)

	Costs	Savings	Returns	Benefit/Cost Ratio
Open Access Scenarios (in HE & Public)				
<i>Scenario: German National OA</i>				
OA Publishing	1,898	197	1,863	1.1
OA Repositories (Green OA)	445	88	1,863	4.4
OA Repositories (Overlay Services)	1,779	197	1,863	1.2
<i>Scenario: Worldwide OA</i>				
OA Publishing	1,898	3,208	1,863	2.7
OA Repositories (Green OA)	445	1,425	1,863	7.4
OA Repositories (Overlay Services)	1,779	3,208	1,863	2.9
NLP	379	866	399	3.3

Note: Compares alternative models against subscription or toll access, with costs, savings and benefits expressed in Net Present Value over 20 years (EUR millions). Increased returns to R&D relate to combined higher education and national public expenditure on R&D. The NLP transition is modeled in the same way as open access alternatives for comparative purposes even though the NLP has been in operation for four years.

Internationaler Vergleich der Ergebnisse: Deutschland vs. UK (Mio EUR über 20 Jahre und cost/benefit ratio)

	Savings	Increased Returns	Costs	Net	Cost / Benefit
OA Scenarios GERMANY (HE and Public)					
OA Publishing (Gold OA)					
Worldwide OA	3,208	1,863	-1,898	3,173	2.7
Unilateral OA	197	1,863	-1,898	162	1.1
OA Repositories (Green OA)					
Worldwide OA	1,425	1,863	-445	2,843	7.4
Unilateral OA	88	1,863	-445	1,506	4.4
OA repositories (overlay services)					
Worldwide OA	3,208	1,863	-1,779	3,292	2.9
Unilateral OA	197	1,863	-1,779	281	1.2
OA Scenarios UNITED KINGDOM (HE and Public)					
OA Publishing (Gold OA)					
Worldwide OA	3,282	836	-2,429	1,688	1.7
Unilateral OA	279	836	-2,429	-1,315	0.5
OA Repositories (Green OA)					
Worldwide OA	1,238	836	-298	1,777	7.0
Unilateral OA	105	836	-298	643	3.2
OA repositories (overlay services)					
Worldwide OA	3,282	836	-2,118	2,000	1.9
Unilateral OA	279	836	-2,118	-1,003	0.5



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Implikationen:

- Ergebnisse des Houghton Reports für Deutschland sind mit den internationalen Studien vergleichbar
- **Green OA mit Subskriptionen** verzeichnet das höchste Kosten-Nutzen-Verhältnis
- **NLP** sinnvoll – v.a. weil durchsetzbar
- Die **wahren Kosten von Toll Access** ergeben sich nicht nur durch den “Rückkauf” der Informationen, sondern v.a. auch durch **das Verhindern der positiven Effekte effizienter Kommunikation von Forschungsergebnissen** für die Gesellschaft

Further Research:

- **Akzeptanz** der Modelle auf Seiten der **Autoren**?
- Auswirkungen von Open Access auf **Forschungsdaten**?



Wirtschaftsinformatik
Information Systems

Vielen Dank für Ihre Aufmerksamkeit.

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Back Up >

- Deconstructed Journal Model nach Smith (Folie 28)
- Details zu Schätzungen im Houghton-Report (29-40)
- NLP: Hintergründe und Kosten/Downloads-Analyse (41-46)
- Einfluss von OA auf Scientific Knowledge Management (47-49)
- Literatur (50-55)



The “Deconstructed Journal” Model (Smith 1999, 2005)

TABLE 1: THE FIVE KEY TASKS IN JOURNAL PUBLISHING ARE TRADITIONALLY COORDINATED BY PUBLISHERS BUT THE DECONSTRUCTED JOURNAL MODEL SUGGESTS THAT OTHER AGENTS COULD DO THE TASKS EQUALLY WELL – OR EVEN BETTER.

Activity	Agency in traditional model	Agency in DJ model
Quality control (content)	Referees, organised by publisher	Independent Certification Agents (CAs)
Quality control (appearance)	Sub-editors, etc, organised by the publisher	In-house (university, etc), freelance sub-editors or organised by the CA
Conferring recognition of work done	Referees and journal editorial board	Independent CAs or (less directly) editorial boards of overlay journals (also known as virtual journals)
Making available	Publisher – printing the article in an issue and distributing it	Placing of material in local or centralised freely accessible electronic archives or repositories
Making aware or marketing	Publisher – marketing of the journal to libraries and researchers/practitioners	Overlay journals, general or specialised search engines, web directories, subject portals, Weblogs.



Cost estimation parameters 1/4

Parameter	Basis	Value
FUND RESEARCH		
R&D expenditure in 2008	EuroStat	GERD 65.6 bn, HERD 10.7 bn, GovR&D 9.1 bn.
Grant applications, grants and reviews	Deutsche Forschungsgemeinschaft, Alexander von Humboldt-Stiftung, Bundesministeriums für Bildung und Forschung, Volkswagenstiftung, Thyssen-Stiftung, Robert-Bosch-Stiftung and Deutscher Akademischer Austausch Dienst	41,650 applications, 31,640 grants, 92,000 reviews
External peer review of grant applications	Tenopir and King (2000) time to review a journal article	3 to 6 hours each, average 4.5 hours
Peer reviews per grant application	Reported reviews received over applications	2.2 per application
Peer review costs, per hour, based on academic salaries and overheads	EuroStat expenditure over FTE researchers	Average EUR 97 per hour
PERFORM RESEARCH		
Researchers (FTE) (Excludes technicians & support)	EuroStat	299,000 (121,000 in higher education and public institutions)
Articles published (Core peer-reviewed articles only)	Web of Knowledge and SCOPUS scaled to account for share of peer reviewed journals not listed (Björk <i>et al.</i> 2008)	Approx. 92,200
Time to write a journal article	Tenopir and King (2000), King (2004)	90 to 100 hours, average 95
Time to peer review an article	Tenopir and King (2000), King (2004)	3 to 6 hours, average 4.5 hours
Number of peer reviewers per article	Tenopir and King (2000)	2 to 3 reviewers, average 2.5
Rejection and resubmission (articles)	Authors' estimate based on a consensus from the literature	50% rejected of which 60% are sent for external review and 40% rejected without review, and of which 75% are resubmitted once



Cost estimation parameters 2/4

Parameter	Basis	Value
Number of peer reviewers per monograph	Industry consultation	2 to 3 reviewers, average 2
Rejection and resubmission (monograph)	Authors' estimate based on a consensus from the literature	20% rejected of which 50% are resubmitted once
Time spent on editorial activities	Industry consultation and authors' estimate	10 to 30 days per annum, average 20
Time spent on editorial board activities	Industry consultation and authors' estimate	½ to 1 day per year, average ¾
Percentage of authors who are editors and/or on editorial boards	Rowlands and Nicholas (2005)	8% and 24%, respectively
Number of readings per researcher per year	Tenopir and King (2000), subsequent tracking studies and Tenopir <i>et al.</i> (2008)	Industry/higher education: <ul style="list-style-type: none"> • Articles 130/280 • Books 53/48 • Reports 65/46 • Trade literature 51/74 • Other items 22/14
Time spent reading an article	Tenopir and King (2007) and Tenopir <i>et al.</i> (2008)	34 minutes falling to 31, but slightly higher for research, estimate 31
Time spent searching for and accessing an article	Tenopir and King (2007), CEPA (2008) and Tenopir <i>et al.</i> (2008)	8 to 17 minutes, average 12.5 but falling, estimate 12.5
Article requests per reading	Tenopir and King (2000), CEPA (2008)	1.3 to 1.4
Time spent by author obtaining permissions per article	Halliday and Oppenheim (1999)	1 to 4 hours, average 2
Percentage of articles photocopied or printed	CEPA (2008) and Tenopir <i>et al.</i> (2008)	20% print, 69% electronic
Cost of printing and copying per page	Authors' estimate	10 cents per page
Time spent printing or copying an article	Authors' estimate	1 to 5 minutes, average 3



Cost estimation parameters 3/4

Parameter	Basis	Value
PUBLISH JOURNALS		
Pages per article	Tenopir and King (2000) and tracking studies, CEPA (2008), King <i>et al.</i> (2008)	11.7 to 14.3, estimate 12.4
Articles per issue	Tenopir and King (2000), CEPA (2008)	10 to 20, estimate 10
Issue per year	Tenopir and King (2000) and tracking studies, CEPA (2008)	8 to 16, estimate 12
Articles per title per year (Location of average article)	Tenopir and King (2000) and tracking studies, Björk <i>et al.</i> (2008)	Average 50 to 150, estimate 120
Non-article content pages	King (2007), King <i>et al.</i> (2008)	10% to 20%, estimate 14%
Article rejection rate	Consensus from literature	40% to 60%, estimate 50% (20% rejected without review)
Subscriptions per title	Tenopir and King (2000), CEPA (2008)	Estimated average 1,200
Management and investment margin	CEPA (2008)	20% to 25%, estimate 20%
Surplus / profit margin	CEPA (2008) adjusted	10% to 30%, estimate 20%
E-only delivery and fulfilment (relative to print)	CEPA (2008), Waltham (2005), etc. adjusted	25%
E-only content processing (relative to print)	CEPA (2008), Waltham (2005), etc. adjusted	25%
OA rights management (relative to toll)	Authors' estimate	20%
OA user support (relative to toll)	Authors' estimate	20%
'Author-pays' marketing and support costs (relative to toll)	Authors' estimate	33%
OA hosting (relative to toll)	Authors' estimate	50%
OA management and Investment (relative to toll)	Authors' estimate	75%
OA surplus/profit (relative to toll)	Authors' estimate	75%



Cost estimation parameters 4/4

Parameter	Basis	Value
DISSEMINATION		
University library expenditure, acquisitions and stocks	HBZ: Deutsche Bibliotheksstatistik	Wissenschaftliche Universal- und Hochschulbibliotheken Acquisitions EUR 320 million, and estimated non-acquisition costs EUR 640 million
Library staff salaries	HBZ: Deutsche Bibliotheksstatistik	Average EUR 39,560 per annum, EUR 36 per hour
Library activity and journal handling times	Schonfeld <i>et al.</i> 2004; King <i>et al.</i> 2004	Minutes reported converted to EUR at average library staff salaries
Annual NLP journal acquisition costs	Goethe-Universität Frankfurt	Annualised, EUR 12 million
Annual NLP acquisition costs for other content	Goethe-Universität Frankfurt	Annualised, EUR 1.13 million
Annual NLP non-acquisition costs	Goethe-Universität Frankfurt	Annualised, EUR 655,140
Number of NLP participating institutions	Goethe-Universität Frankfurt	Average across all current package content, 167
Number of current journal titles	Goethe-Universität Frankfurt	Current packages, 11,975 In system, 12,293
Hosting costs for NLP	NIH (2008) reported archiving costs	Approximately EUR 40 per article (submission-equivalent)
Author fees	Sample of OA journals	EUR 2,000 per article published
Repository counts	http://archives.eprints.org/	Current & estimated system



Estimated annual costs: research related activities (EUR, 2008)

Activity / Item	Estimate
READING	
Reading per year (National)	
Papers (journal)	5,559,800,000
Books (monographs + edited books)	13,820,300,000
Other (Conference papers, Reports, etc.)	5,387,200,000
Cost of reading by authors (National)	7,677,100,000
Reading per year (Public Research)	14,217,200,000
Papers (journal)	3,846,800,000
Books (monographs + edited books)	7,658,200,000
Other (Conference papers, Reports, etc.)	2,712,300,000
Cost of reading by authors (Public Research)	6,301,400,000
WRITING	
Writing per year (National)	
Papers (journal & conference)	916,600,000
Books (monographs + edited books)	1,363,100,000
Chapters	150,000,000
Writing per year (Public Research)	2,383,300,000
Papers (journal & conference)	895,100,000
Books (monographs + edited books)	1,346,400,000
Chapters	141,800,000



Estimated annual costs: research related activities (EUR, 2008)

Activity / Item	Estimate
SEARCH & DISCOVERY	
Search and Discovery (National researchers)	3,924,400,000
Search and Discovery (Public researchers)	1,588,100,000
PRINTING & COPYING (Public Research)	
Print and copying	84,400,000
Total including time spent	302,500,000
PERMISSIONS	
Cost to authors (National researchers)	34,200,000
Cost to authors (Public researchers)	33,600,000

Source: German model: Authors' analysis.



Estimated annual costs: research grants related activities (EUR, 2008)

Activity / Item	Estimate
RESEARCH GRANTS	
Grant applications (National)	
Preparation of grant applications (National)	534,870,000
Review of grant applications (National)	385,400,000
Reporting grant project (National)	44,800,000
Administering grant projects (National)	92,500,000
Administering grant projects (National)	12,170,000
Grant applications (Public Research)	
Preparation of grant applications (National)	457,710,000
Review of grant applications (National)	329,800,000
Reporting grant project (National)	38,400,000
Reporting grant project (National)	79,100,000
Administering grant projects (National)	10,410,000

Note: Includes grants relating to major agencies only. Local and agency differences in reviewing and reporting practices are such that these estimates can be no more than approximate.

Source: German model: Authors' analysis.



Estimated annual costs: publisher related activities (EUR, 2008)

Activity / Item	Estimate
PEER REVIEW	
Peer review per year (National)	
Papers (journal & conference)	229,300,000
Books (monographs + edited books)	44,400,000
Chapters	19,500,000
Peer review per year (Public Research)	291,300,000
Papers (journal & conference)	229,000,000
Books (monographs + edited books)	43,800,000
Chapters	18,500,000
JOURNAL EDITORIAL	
Editorial activities (National)	197,500,000
Editor activities	177,800,000
Editorial board activities	19,700,000
Editorial activities (Public Research)	157,100,000
Editor activities	141,400,000
Editorial board activities	15,600,000

Source: German model: Authors' analysis.



Estimated per item object costs (EUR, 2008)

Cost of journal articles (per article)	Estimate
Writing	9,300
Peer review (per published)	2,400
Publisher related	3,800
Library acquisition (including free and copyright deposit titles)	0.38
Library handling	0.30
Per article production	15,500
Publisher share of production costs	25%

Cost of academic books (per title)	Estimate
Writing	111,000
Peer review (per published)	3,600
Publisher related	23,000
Distribution related (print)	9,9000.38
Library acquisition (books per item)	-
Library handling	-
Per monograph production	147,600
Publisher and distributor share of production costs	22%

Note: Writing costs include those items that are not published while all other costs are per item published. Acquisition costs include copyright deposit and free materials, but are excluded from the totals to avoid double counting.
 Source: German model: Authors' analysis.



Impact, Savings, Returns: Scenario parameters 1/2

Parameter	Basis	Value
FUND RESEARCH		
Funding, evaluation and reporting as a share of operational costs	Authors' estimate	50%
Potential savings in these costs from open access	Authors' estimate	5% to 10%, estimate 5%
Potential savings in these costs from NLP	Authors' estimate	None
Returns to publicly funded R&D	Literature review (conservative consensus from the literature)	20% to 60%, estimate 20%
Improved allocations increase returns to R&D	Authors' estimate	1% to 5%, estimate 2.5%
Increase in allocations to R&D	Authors' estimate	1% to 5%, estimate 2.5%
PERFORM RESEARCH		
Search, discovery and access time saving through OA/NLP	Authors' estimate	5% to 10%, estimate 5% 5% to 10%, estimate 5%
Permissions time saving through OA/NLP	Authors' estimate	40% to 60%, estimate 50% None
Peer review time saving through OA/NLP	Authors' estimate	5% to 20%, estimate 10%
Writing and preparation time saving through OA/NLP	Authors' estimate	5% to 10%, estimate 5% 5% to 10%, estimate 5%
PUBLISH		
Share of worldwide scholarly publishing output (articles)	Web of Knowledge, SCOPUS and Björk <i>et al.</i> (2008)	6.1%
OA competition reduces publisher costs and margins	Authors' estimate	5% to 10%, estimate 5%
DISSEMINATE		
Time for self-archiving per item	Harnad, Swan (2008), etc. adjusted	10 minutes
Self-archiving performance	Done by researcher at average cost per hour	EUR 16.25

Source: Authors' analysis..



Impact, Savings, Returns: Scenario parameters 2/2

Parameter	Basis	Value
CHANGE IN ACCESSIBILITY		
Percentage change in accessibility (OA access)	(i) 50% of the 20% of the stock of knowledge that is journals (ii) 50% of the 40% of the stock of knowledge that is publications	10% to 20%
Percentage change in accessibility (OA citation)	(i) 25% of the 20% of the stock of knowledge that is journals (ii) 25% of the 40% of the stock of knowledge that is publications	5% to 10%
<i>Estimated percentage change in accessibility due to OA</i>	<i>Conservative consensus of the above</i>	<i>5% to 10%, conservative 5%</i>
<i>Change in accessibility due to NLP</i>	<i>Small increase in German access, but no increase in worldwide access as its published in the same way</i>	<i>0.2%</i>
CHANGE IN EFFICIENCY		
Percentage change in efficiency (wasteful expenditure: duplicative research and blind alleys)	Authors' estimate, for illustrative purposes	1% to 5%, estimate 2%
Percentage change in efficiency (new opportunities: collaborative opportunities)	Authors' estimate, for illustrative purposes	1% to 5%, estimate 2%
Percentage change in efficiency (speeding up the process)	Authors' estimate, for illustrative purposes	1% to 5%, estimate 2%
<i>Estimated percentage change in efficiency due to OA</i>		<i>Conservative 5%</i>
Percentage change in efficiency (wasteful expenditure: duplicative research and blind alleys)	Authors' estimate, same as OA but scaled to NLP share of titles	As OA 1% to 5% (2%) Scaled is 1.28%
Percentage change in efficiency (new opportunities: collaborative opportunities)	Authors' estimate, half OA because it impacts domestic collaboration not international	0.5% to 2.5%, estimate 1%
Percentage change in efficiency (speeding up the process)	Authors' estimate, NLP has no impact on publishing	0%
<i>Estimated percentage change in efficiency due to NLP</i>	<i>Scaled to share of NLP to world titles</i>	<i>Conservative 2%</i>
R&D PARAMETERS		
Returns to R&D	Conservative consensus from literature (Geuna & Arundel 2003; Hall <i>et al.</i> 2009)	20% to 60%, estimate 20%
Rate of growth in R&D spending	EuroStat (public sector)	2.8% per annum (current prices)
Average lag between R&D spending and impacts	Mansfield (1991, 1998)	3 years to publication plus 7 years to impact, 10 years
Discount rate (risk premium)	Conservative consensus from literature	10% per annum



Estimated average publisher costs per article by format and model (EUR, 2008)

		<i>Estimate</i>
Subscription Journal Publishing		
Per article costs PRINT		3,485
Per article costs DUAL-MODE		4,229
Per article costs E-ONLY		3,109
 OA Journal Publishing		
Per article costs E-ONLY		1,959
 OA Self-archiving (Publisher overlay services)		
Peer review management as an overlay service		567
Editing and proofing as an overlay service		846
Hosting as an overlay service		193
'Full service' overlay (per article)		1,606

Note: These costs exclude the external costs of peer review and VAT. Overlay services include operating peer review management, editing, proofing and hosting, with commercial margins. Estimates for print and dual-mode OA publishing exclude print or subscriber related costs, assuming that the content is produced print ready and print is an add-on.

Source: German model: Authors' analysis.



NLP: Produktgruppen

Produktgruppe 1	Abgeschlossene Zeitschriften
Produktgruppe 2	Laufende Zeitschriften
Produktgruppe 3	Volltextdatenbanken
Produktgruppe 4	Bibliographische Datenbanken Digitale Wörterbücher



Ausgaben für das NLP

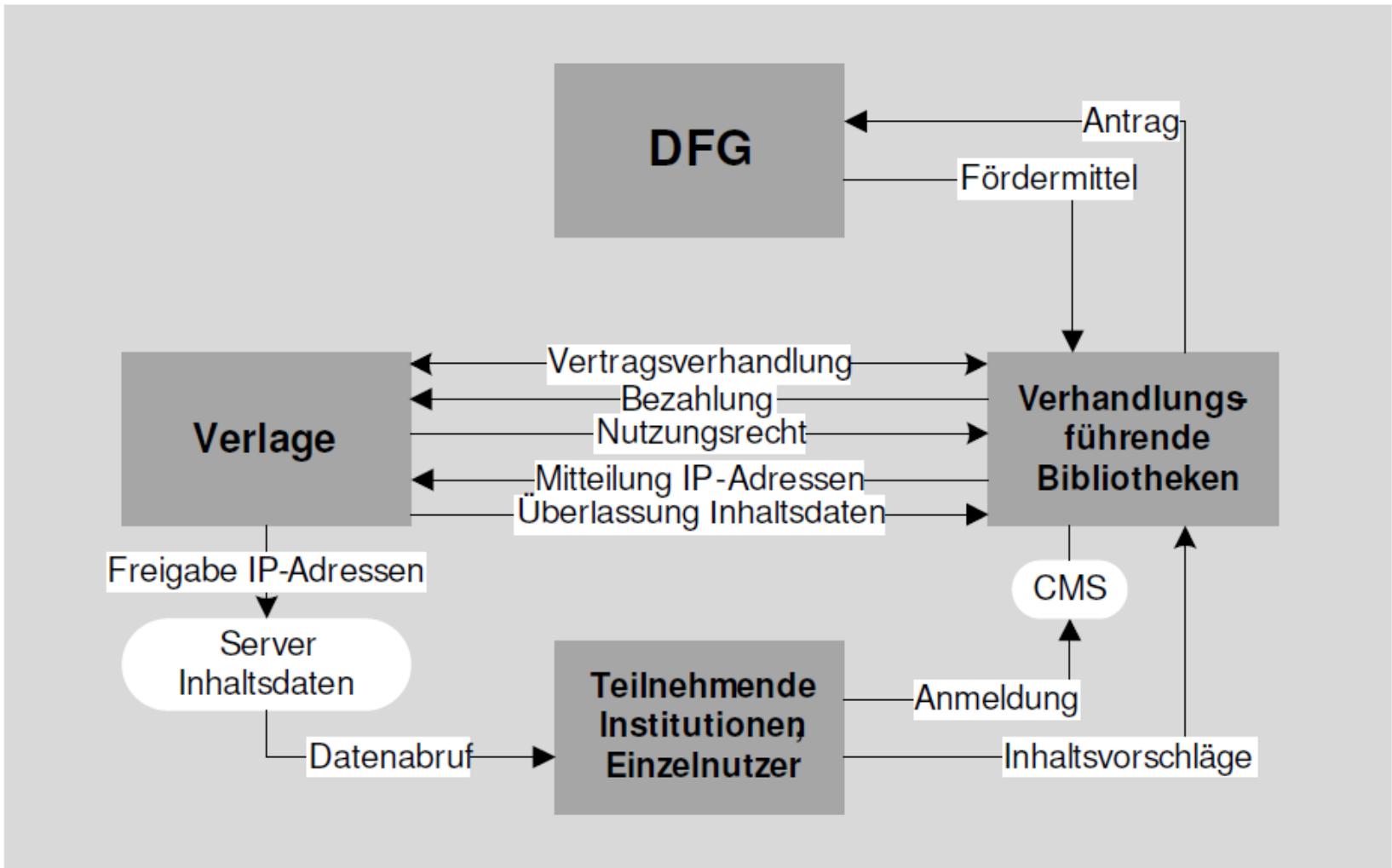
Jahr	Ausgaben NLP	Anteil an Etat LIS	Etat LIS
2010	17,1	25%	67,8
2009	13,8	20%	69,2
2008	11,1	20%	56,2
2007	33,1	53%	62,9
2006	18,4	33%	55,1*
2005	21,6	39%	55,9*
2004	6,5 (ca.)	16%	41,9*
Summe	121,5	30% Ø	409,1*

TABELLE 1: DFG-Ausgaben für NLP und Anteil an LIS 2004 – 2010 (Angaben in Mio.€)

*bis 2006 NLP gefördert als Sonderfördermaßnahmen, hier Summe aus offiziellem LIS-Etat und NLP-Ausgaben

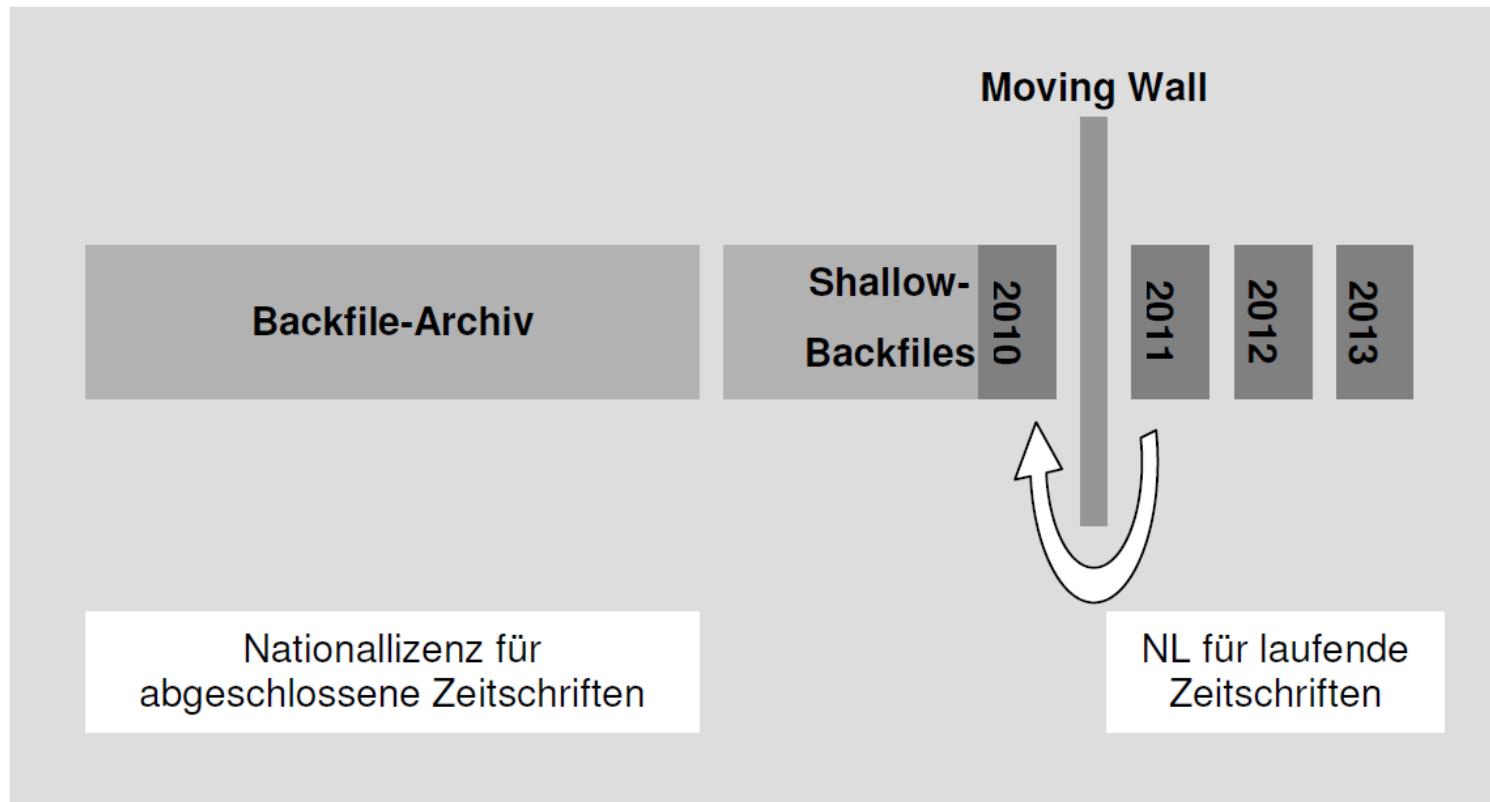
Quellen der Berechnung: Wiesner (2007b); DFG (2006c), S.69; DFG (2007), S.87; DFG (2008b), S.82; DFG (2009d), S.107; DFG (2010d), S.123; DFG (2011b), S.105.

Beziehungsdiagramm NLP





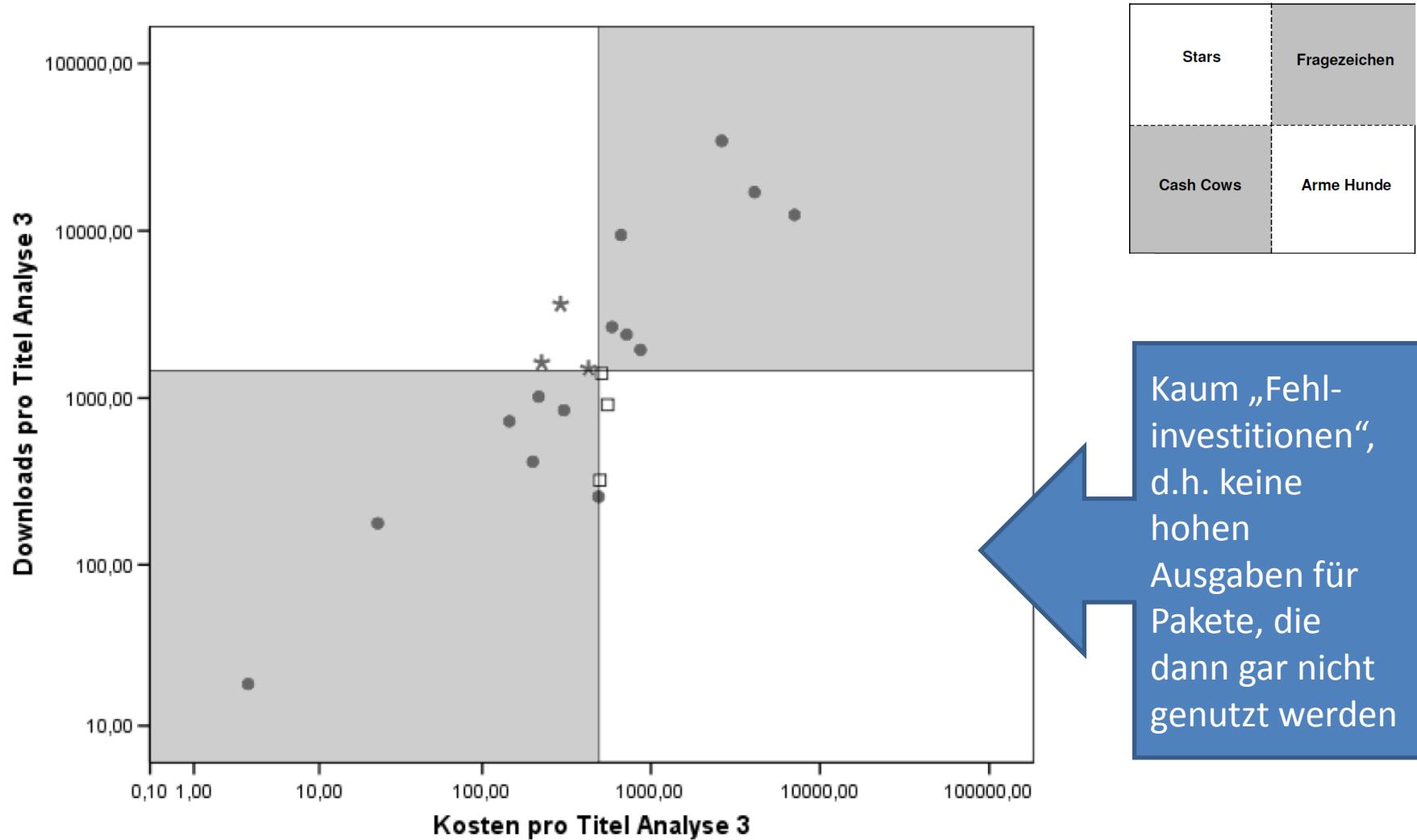
NLP: Archivbildung durch laufende Zeitschriften



Kompletter retrospektiver OA
(klassische NL, d.h. für „alle“ zugänglich)

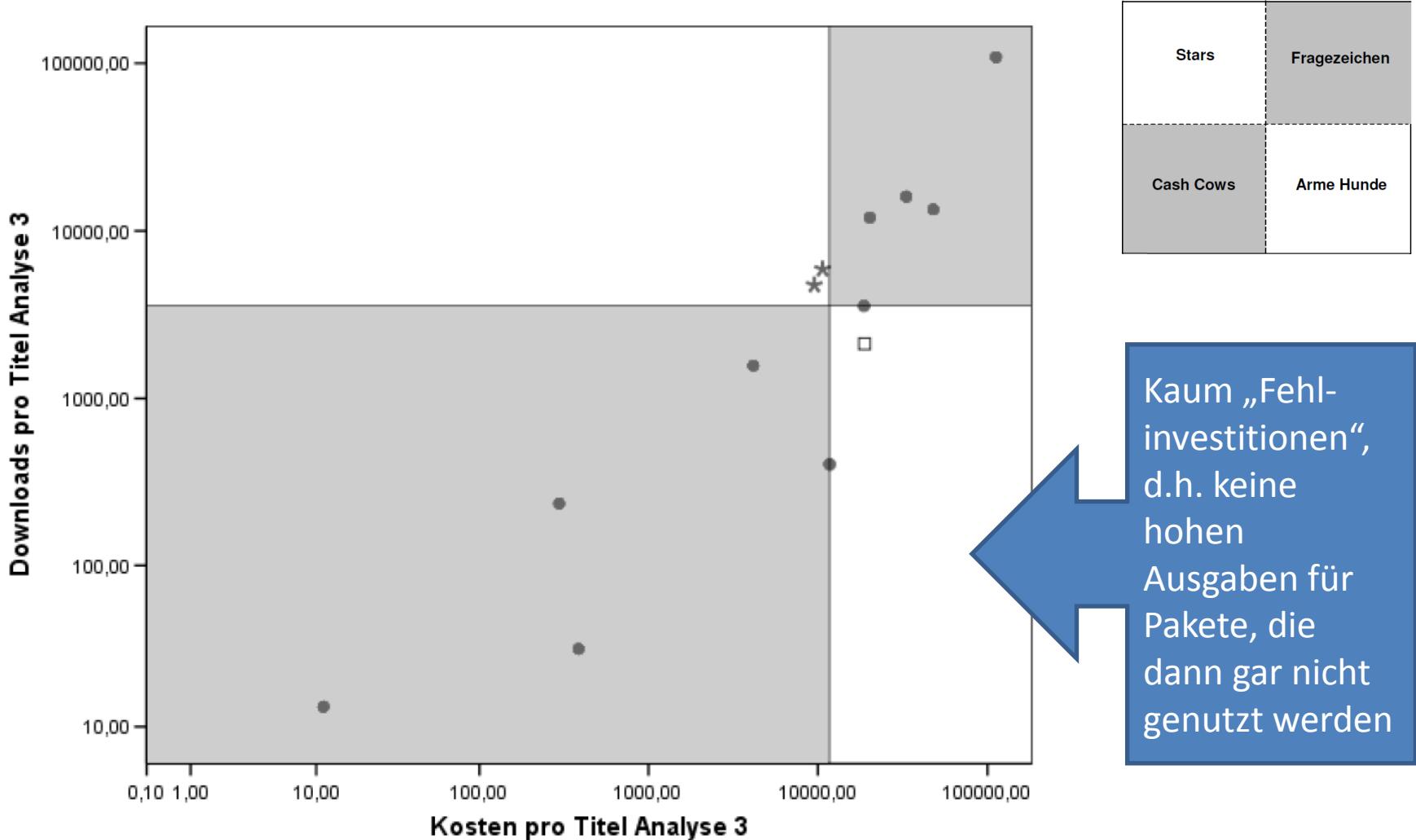
Für teilnehmende Institutionen zugänglich (Opt-In-Modell)

NLP: Kosten pro Download (Pakete; abgeschlossene Zeitschriften)



Kaum „Fehl-investitionen“, d.h. keine hohen Ausgaben für Pakete, die dann gar nicht genutzt werden

NLP: Kosten pro Download (Pakete; laufende Zeitschriften)

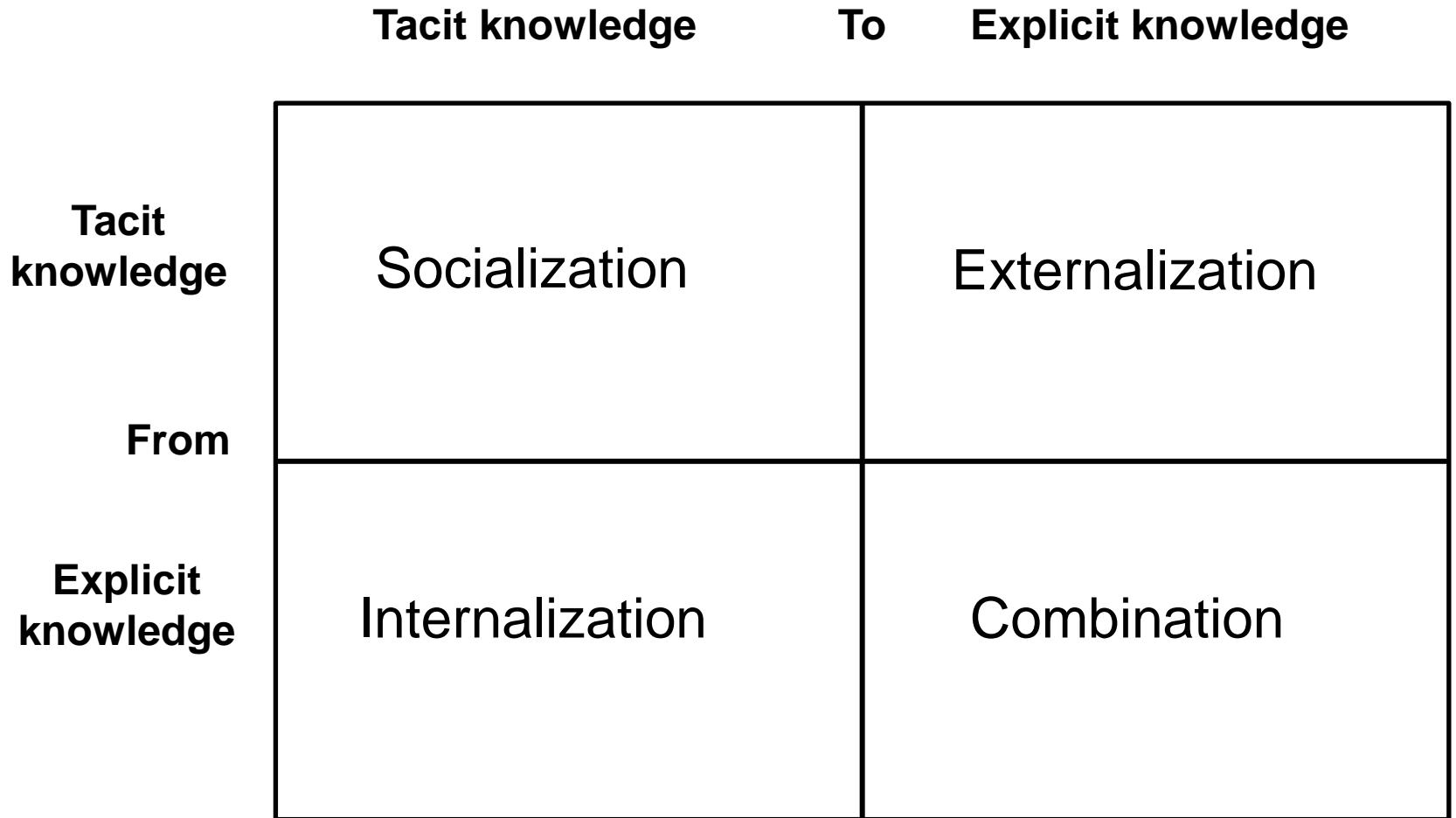


Kaum „Fehl-investitionen“, d.h. keine hohen Ausgaben für Pakete, die dann gar nicht genutzt werden



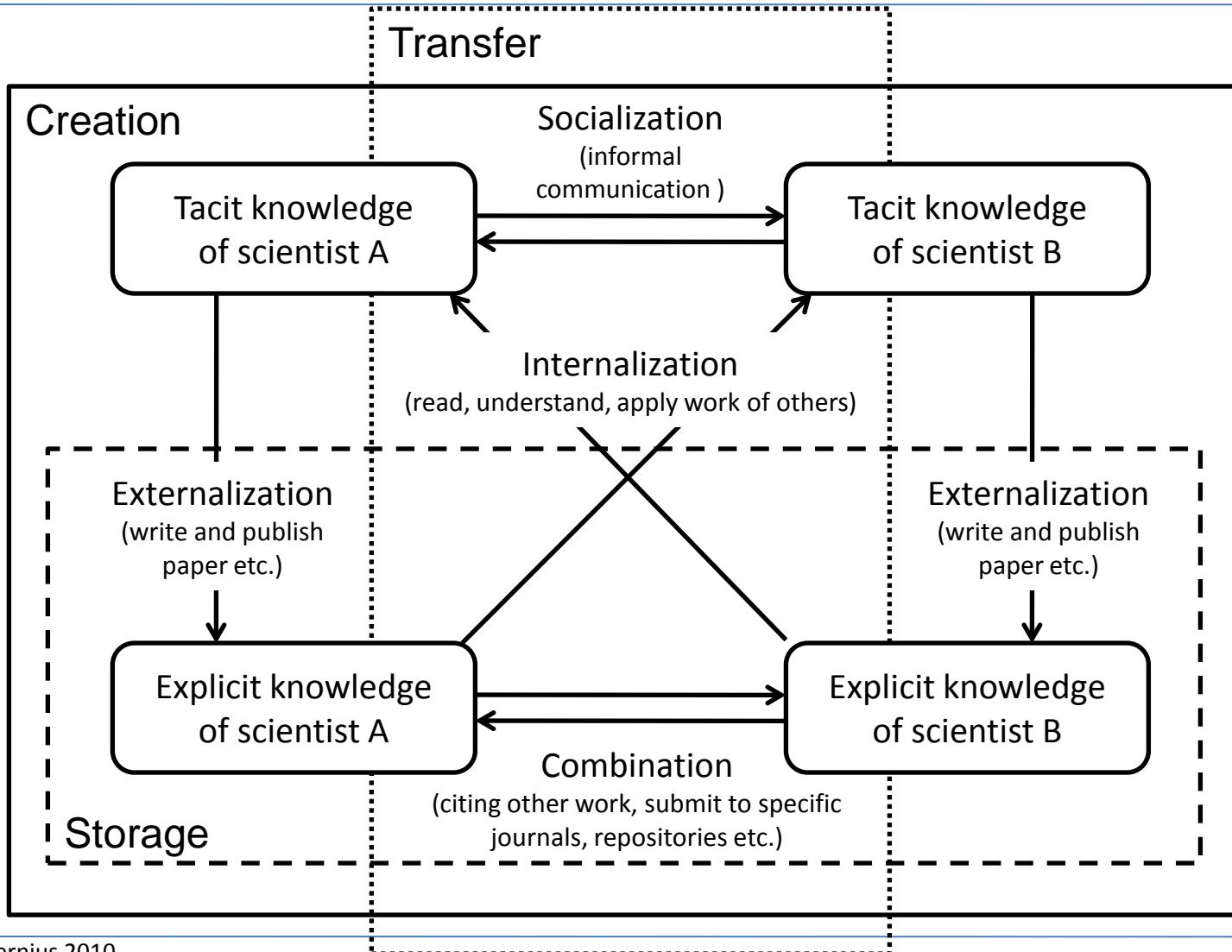
Impacts of OA on “scientific” knowledge management 1/3

Nonaka’s SECI model of knowledge creation



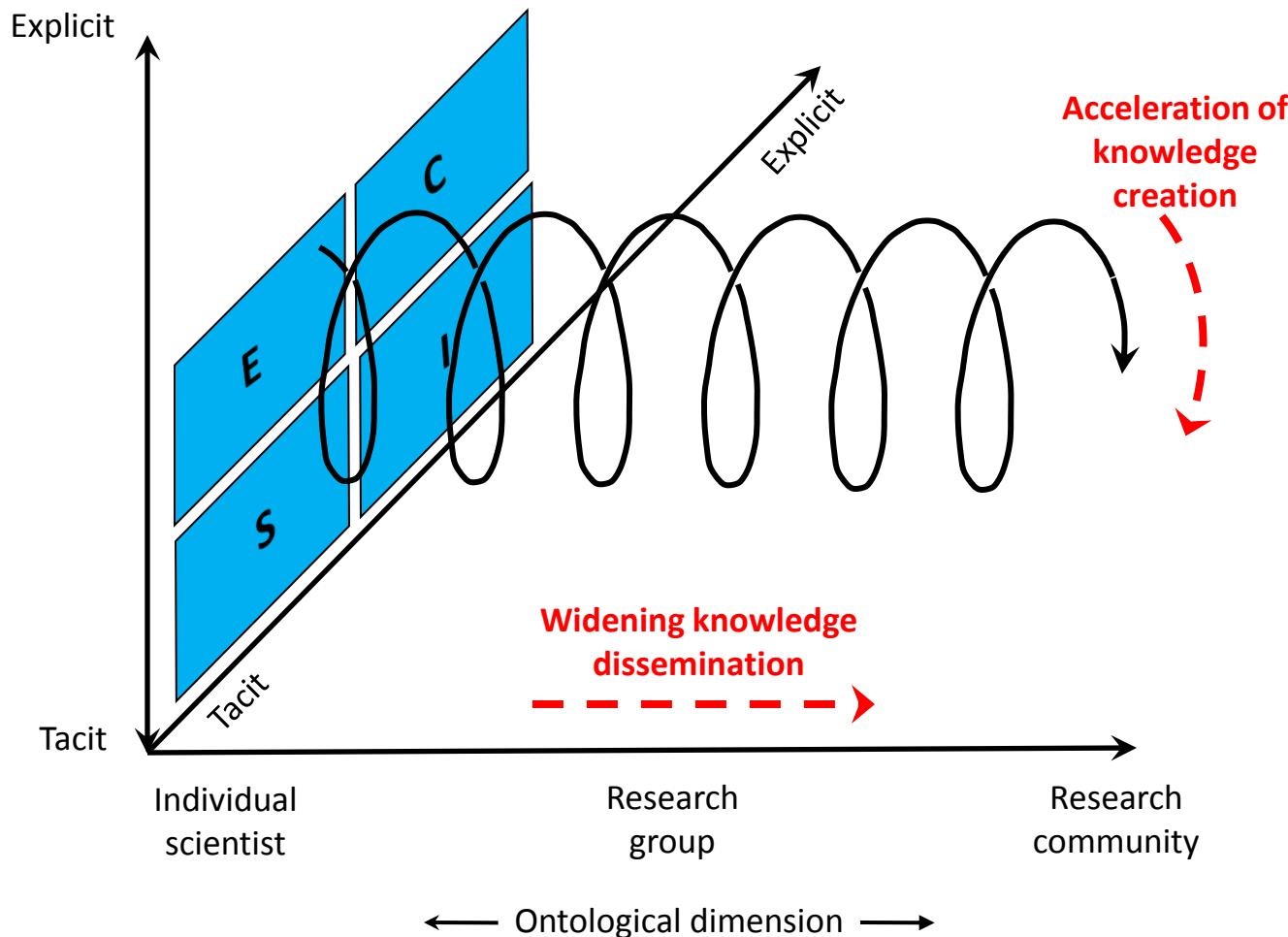


Impacts of OA on “scientific” knowledge management 2/3





Impacts of OA on “scientific” knowledge management 3/3 “Speeding up the spiral”



Source: Bernius 2010



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