

Improvement of Scientific Communication & Quality Assurance by Open Access Publishing



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Motivation

- *open access perspectives & challenges*

Interactive Peer Review & Public Discussion

- *principles & effects*

Interactive Journal “*Atmospheric Chemistry and Physics*”

- *achievements & infrastructure*

Alternatives & Future Developments

- *key features & perspectives*

Outlook

- *vision & propositions*

Scientific, economic & educational advantages of free online availability of scientific research publications

Educational:

- *information & stimulation for students & general public*
- *global & social equity of opportunities in the information society*

Economic:

- *liberation of distorted scientific information market*
- *resolution of serial & budget crisis at university & research libraries*

Scientific:

- *enhancement of research impact & productivity*
- ***improvement of quality assurance: more important, larger need & larger gain than “mere access & impact”***
- *acceleration of scientific progress*

Open Access Conference Berlin 2003 - Working Group Statement

1. We expect that the transition to open access will **enhance the quality assurance and evaluation of scholarly output**. This will be a **direct consequence of the free availability of information**.
2. In disciplines where peer-review is a cornerstone of the scientific information system, open-access publishing has demonstrated the same standards as traditional publishing. We foresee that open access will allow the development of even **more effective peer-review by**
 - allowing **interactive forms of review and discussion**,
 - permitting **more efficient and more inclusive selection of referees**, and
 - giving **referees more information with which to do their work**.
3. Open access allows the development of new forms of measurement of the quality and impact of scholarly work. The globalization of scholarly activities requires a global assessment of their impact, which is only possible if there is free access to information. Measures that go beyond simple citation counting have already evolved in communities where open access is the rule.
4. In order to improve the quality of scholarly assessment, we urge funding organizations to require all scholarly output to be archived in an open-access environment and to support any costs associated with quality assessment and archiving for such environments.

Large proportion of scientific publications are careless, useless, or false

The “Tip of the Iceberg”: fraud

- *falsification, selective omission & tuning of results*
- *e.g. Schön et al., 2002/2003: retraction of > 20 papers from top journals (Science, Nature, Phys. Rev., etc.); cold fusion (1988/1989)*

The “Norm”: carelessness & uselessness

- *superficial & irreproducible description of experiments & models*
- *non-traceable arguments & conclusions, duplicate & split papers, etc.*

The Consequences: waste & misallocation of resources

- *costly reconstruction of poorly described methods & results*
- *propagation of errors & misinterpretations, misevaluation of projects & scientists (publication numbers vs. quality), etc.*

Traditional journals & peer review fail to provide efficient scientific exchange & quality assurance

Editors & Referees: limited competence & conflicting interests

- *few editors for large subject areas*
 - ⇒ *limited knowledge of scientific details & specialist referees*
- *work overload, conflicting interests & little gain for referees*
 - ⇒ *superficial or prejudiced review & evaluation*

Closed Peer Review: retardation & loss of information

- *publication delays, watering down of messages, plagiarism*
- *critical, supportive & complementary comments unpublished*

Traditional Discussion: sparse & late commentaries

- *labor-intensive, delayed & watered-down by peer review*
(comment/article ratio 1978 ⇒ 1998: 1/20 ⇒ 1/100)

***Two conflicting needs of scientific publishing:
rapid publication vs. thorough review & discussion***

Rapid Publication: widely pursued

- *required for efficient exchange of new findings & open questions*
- *traditional journals push for short peer review times (2-4 weeks) & short papers with little detailed information*
- *information market flooded with preprints & proceedings with no or little quality assurance*

Thorough Review & Discussion: widely neglected

- *required to identify scientific flaws, useless research & duplications*
- *rarely possible by a couple of referees within 2-4 weeks*
- *frequently ignored for spectacular high-impact publications*
- *uncritical trust of publications in journals with high statistical impact factors*

***Two-stage open access publication with
interactive peer review & public discussion***

Stage 1: Rapid publication of Discussion Paper

*pre-selected by editors (referees), fully citable & permanently archived
(more than traditional preprint)*

Public Peer Review & Interactive Discussion

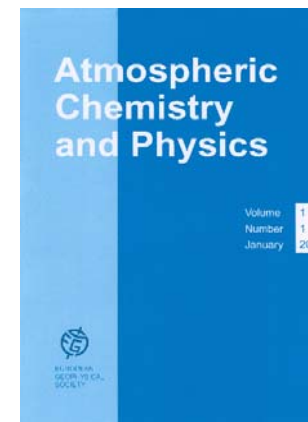
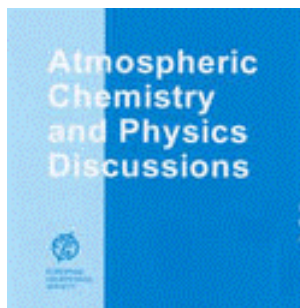
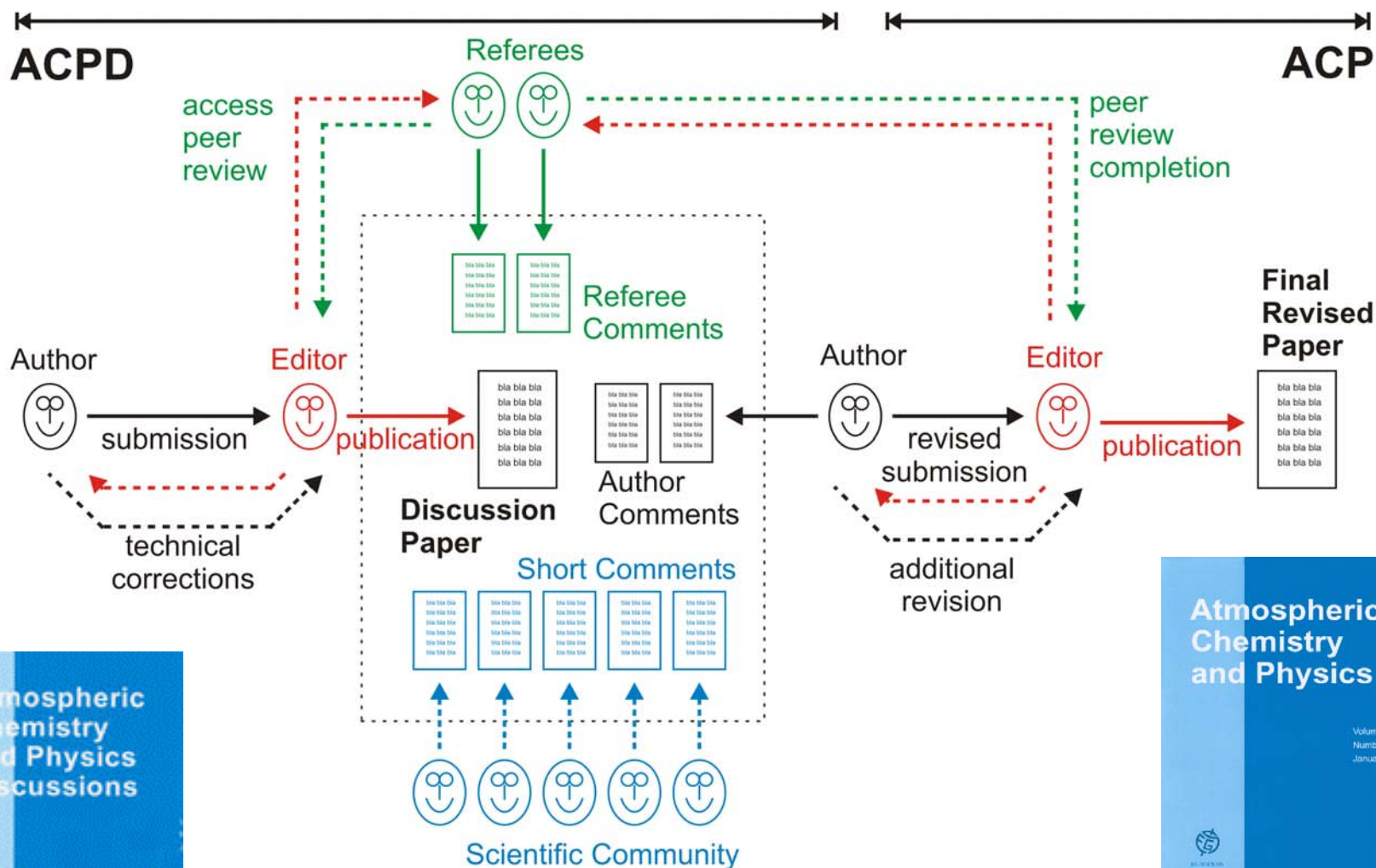
*referee comments & additional comments by interested colleagues
published alongside the discussion paper (anonymous or attributed,
non-reviewed but individually citable & permanently archived)*



Stage 2: Review completion & publication of Final Paper

analogous to traditional peer review & journal publication

Discussion Forum (Stage 1) + Journal (Stage 2)



All-win situation for authors, referees & readers

Discussion Paper

- *free speech & rapid publication (authors & readers)*

Interactive Peer Review & Public Discussion

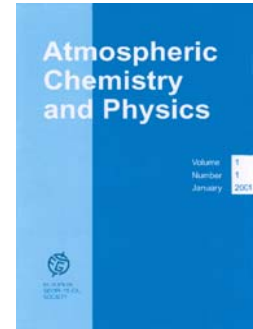
- *direct feedback & public recognition for high quality papers (authors)*
- *prevention of hidden obstruction & plagiarism (authors)*
- *documentation of critical comments, controversial arguments, scientific flaws & complementary information (referees & readers)*
- *deterrence of careless, useless & false papers (referees & readers)*

Final Paper

- ***maximum quality assurance & information density***
through complete peer review, public discussion & final revision (readers)

Publisher & Distribution

- *European Geosciences Union (EGU)*
- *free internet access (www.atmos-chem-phys.org)*
- *paper copies & CDs printed & sold on demand*
- *full coverage by ISI-SCI (since launch in 2001)*
- *copyright: initially EGU, now authors (Creative Commons Licence)*



Editors

- *globally distributed network of ~ 70 editors covering 32 major subject areas*
- *coordination by executive committee & chief executive editor*
- *advisory board chaired by Nobel laureate P. J. Crutzen*

Publication Market

- *~ 40 traditional journals publishing ~ 4000 atmospheric science papers/yr*
- *major competitors: J. Geophys. Res. (AGU) ~ 1000 papers/yr, Atmos. Environ. (Elsevier) ~ 500 papers/yr, J. Atmos. Chem. (Springer) ~ 100 papers/yr, etc.*
- **ACP: > 300 papers/yr, increasing (0 ⇒ 10% in 4 years)**

Discussion Papers

- **submission rate** (*increasing*): ~ 30 month⁻¹
- **rejection rate** (*access review*): ~ 10 %
- **submission-to-publication time**: 1-2 months (min: 10 days)

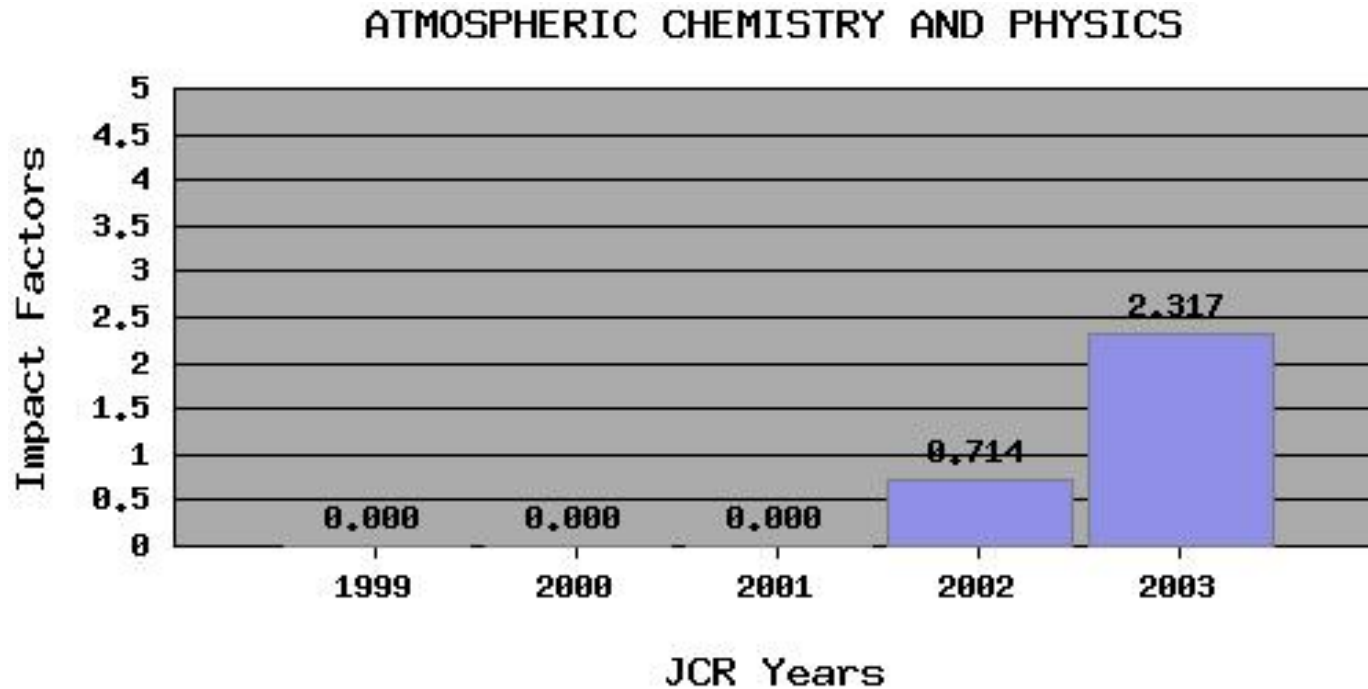
Interactive Comments

- *comments / paper*: ~ 4 (max: 13)
- *comment pages / article page*: ~ 1/3
- *referee anonymity (exp. vs. mod.)*: ~ 60 % (80% vs. 40%)
- *additional public comments / paper*: ~ 1/4
- *peer-reviewed commentaries / paper*: ~ 1/100 (≈ trad. journals)
- *constructive suggestions, harsh criticism & open applause; no abuse*

Final Papers

- **rejection rate** (*review completion*): ~ 10 %
- **submission-to-publication time** (*total*): 3-6 months

**Faster publication, higher quality & higher impact (citations)
than most traditional journals with high rejection rates (~ 60 %)**



ISI Journal Citation Report 2003 (*only 2 years after journal launch*)

- **ACP impact factor** (*citations 2003 to papers of 2001 and 2002*):
2.32 - # 12 out of 46 atmosphere science journals in ISI (incl. meteo & clim.)
- **ACP immediacy index** (*citations 2003 to papers of 2003*):
0.76 - # 1 out of 46 atmosphere science journals in ISI (incl. meteo. & clim.)

Recent Conferences: ACP (EGU) breaks traditional „monopoly“ of JGR (AGU)

New Interactive Open Access Journals

- **Biogeosciences, Hydrology, Ocean Science, Climate Sci., Space Sci.** launched in 2004/2005; *Geology & Geodesy* in preparation

Publisher: Copernicus Society (Katlenburg-Lindau, www.copernicus.org)

- on behalf of various scientific societies (EGU/EGS, URSI, AEF, etc.);
service charges: ~ 20 EUR/Page; ~ 500-1000 EUR/Paper (decreasing)
digital printing on demand: ~ 50 EUR/Issue

Central Online & Open Access Library (COOL)

- internet platform for scientific open access publications with advanced **search, alert & referencing services**
- open to all scientific societies & organisations, www.sref.org/cool

Society Reference Catalogue (SRef)

- scientific internet referencing & document identification system
- **non-profit alternative** to commercial **Digital Object Identifier (DOI)**,
www.sref.org/site

Open access two-stage publication with public peer review & interactive discussion

Publication of discussion paper before full review & revision

- ⇒ *rapid publication, **free speech & public accountability** of authors*
- ⇒ *fewer careless submissions by authors relying on referee support*

Interactive peer review & public discussion

- ⇒ *public comments support peer review, revision & editorial decision*
- ⇒ *maximum **quality assurance & information density***

Optional anonymity for referees (not for other commentators)

- ⇒ *maintenance of classical **peer review***

Archiving & citability of all discussion papers & comments

- ⇒ *documentation of **controversial scientific innovations & flaws** in papers reviewed & commented but finally rejected*

Interactive journal with initial “private peer review”

- e.g. *Journal of Interactive Media in Education (JIME)*
- **missing documentation** of controversial scientific innovations & flaws in papers rejected after “private peer review”

Traditional journal with “pre-publication history” & “peer commentary”

- e.g. *BioMed Central Medicine Journals (BMC)*
Behavioral & Brain Sciences (BBS)
- **missing documentation** of controversial scientific innovations & flaws in papers rejected after peer review
- no public contribution to peer review, revision & editorial decision
⇒ **sub-optimal** quality assurance & information density

(Traditional) repository//preprint server & (traditional) journal

- e.g. *arXiv.org*
- no guaranteed public reviewing by anonymous referees **(yet)**
⇒ **sub-optimal** quality assurance & information density **(easy to optimize)**

Flexible adaptation & complementation of public peer review & interactive discussion

Adjustment of pre-selection & discussion period

extent of referee involvement & technical corrections

Section for final revised papers with low editorial rating

final revised papers not accepted for publication in main journal (e.g. ACP Contributions, ACPC); multi-level economics journals (bepress)

Statistical rating of individual discussion & final papers

download, commenting & citation statistics

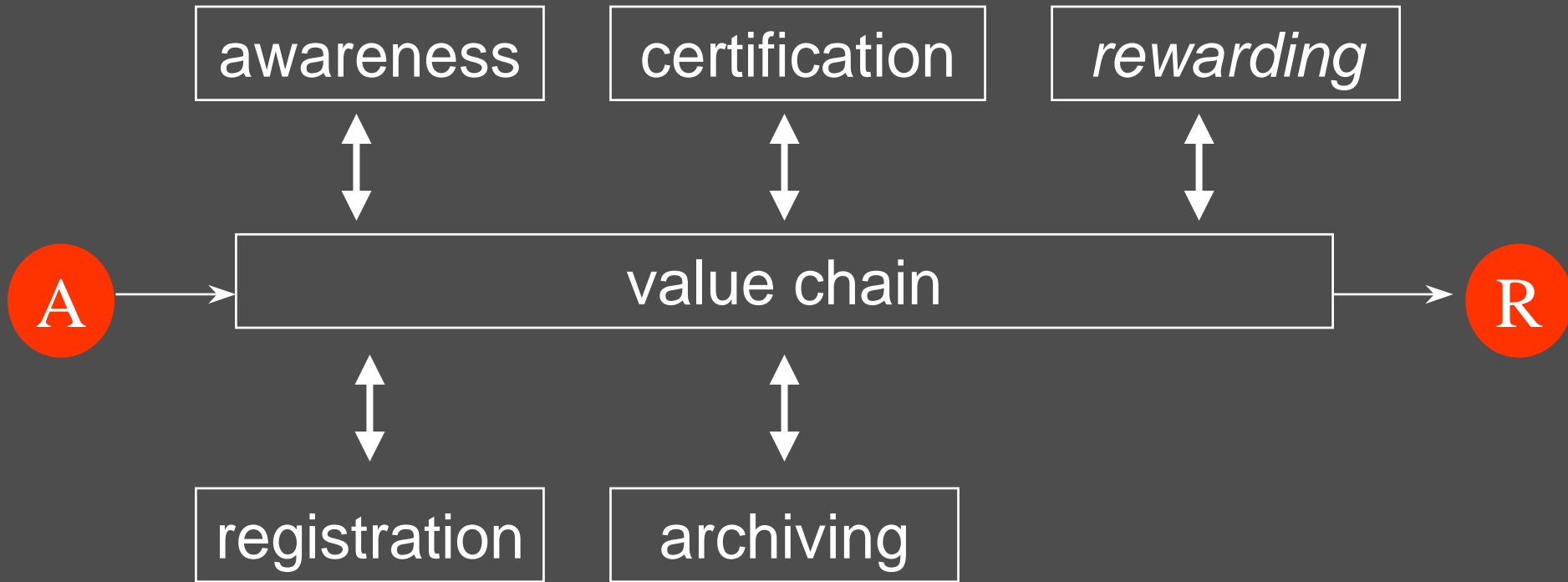
Quality assurance feedback loop

editorial rating (ACP/ACPC) vs. statistical rating of papers (discussion/final)

Integration in large-scale open access publishing systems

evolutionary, non-disruptive transition to “peer networks”

Systems for Scholarly Communication



Disaggregated Systems: open to current agents, new entrants, value added services, and various business models

The Innovator's Dilemma {Christensen}

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- sustaining vs. disruptive technologies;
 - disruptive technologies:
 - somehow perform worse than established ones
 - not accepted by core customer base
 - but: convenient, cheap, ...
 - disruptive technologies can create competition in an existing value network by creating a new one first.
- => **open access preprints as a disruptive technology**

**Open access discussion papers & interactive journals:
non-disruptive innovation technology**

Future Styles of Assessment

- **Community assessment**
 - Commentaries
 - Review articles
 - Citation analyses (big possibilities in open-access)
- **Organized analysis**
 - Journal peer-review

Slower, more accurate in long-term

Immediate but cruder

Both systems may co-exist: address different needs



Journals become Assessment Houses

1. Author self-archives, sends URL to *Journal of Outstanding Research* (JOR)
2. JOR assesses as today, requests changes, eventually accepts article (insisting on uniqueness)
3. Author pays fee to JOR, moves revised version to an archive library site, attaches JOR seal-of-approval glyph/link to final article (glyph owned/protected by JOR)
4. JOR publishes a list of approved articles on its website, links to author's article URL
5. JOR's charge is a fair charge, allows a profit. Maybe negotiated with funding providers: NSF, MPG, Charge scale could also allow for a proportion of zero-charge articles.



Bernard F Schutz
Albert Einstein
Institute



**Realisation: disaggregated
interactive open access journal**

***Promotion of scientific progress & education
by open access publishing
with public peer review & interactive discussion***

Revaluation & higher information density of scientific literature

public accountability of authors, input from referees & scientific community

⇒ ***better & fewer papers***

Documentation of scientific discussion

free speech & public exchange of arguments

⇒ ***faster identification of controversial innovations & flaws***

⇒ ***better evaluation by specialist & non-specialist readers***

Demonstration & spread of scientific rationalism

transparent & rational approach to address & solve complex problems

⇒ ***better scientific education & information of society at large***

Promote open access archiving & publishing

- **prescribe open access** to publicly funded research results
- **transfer funds** to open access service providers & authors; e.g.:
convert 10-50 % of subscription budgets per year into seed funds
for open access publications (e.g. 1000 EUR per year & scientist)

Emphasize & enhance quality assurance

- **add discussion forums** to new & existing journals & repositories
- minimize publication forms without public review & discussion:
pre-prints, self-archiving, and mere “impact” are not enough !
- change terminology: **preprints** ⇒ **discussion papers**

Improve individual & statistical evaluation of publications

- evaluate papers rather than journals: **commenting & statistics**
- refine basic statistical parameters (citation & download numbers) by
quality assurance factors (number & rating of public comments)