

# **Avaliação da Pesquisa Científica**

## Importância e Necessidade de Redirecionamentos

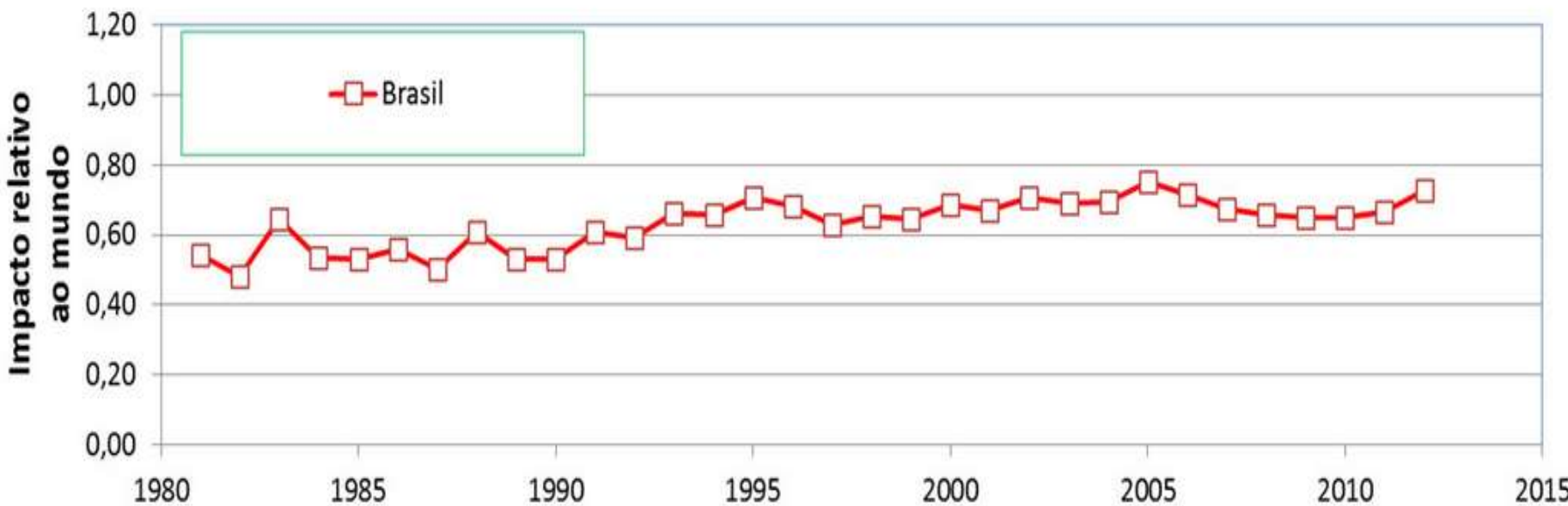
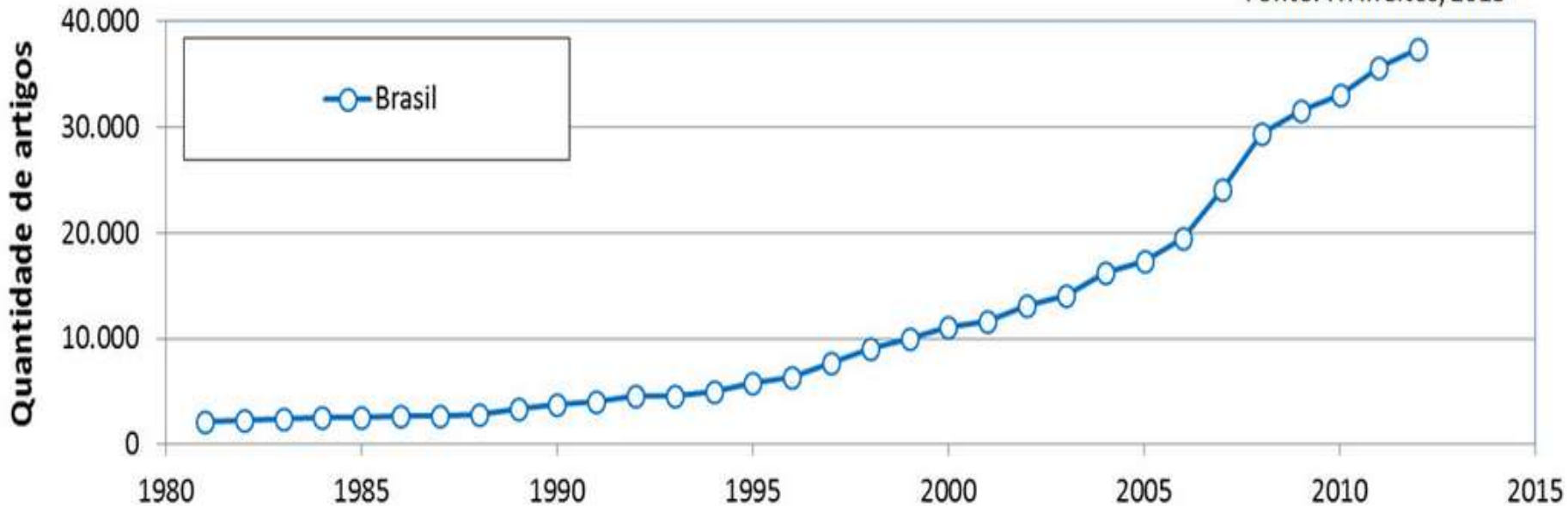
**Mauricio L Barreto**

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Belo Horizonte 26 de Novembro de 2015

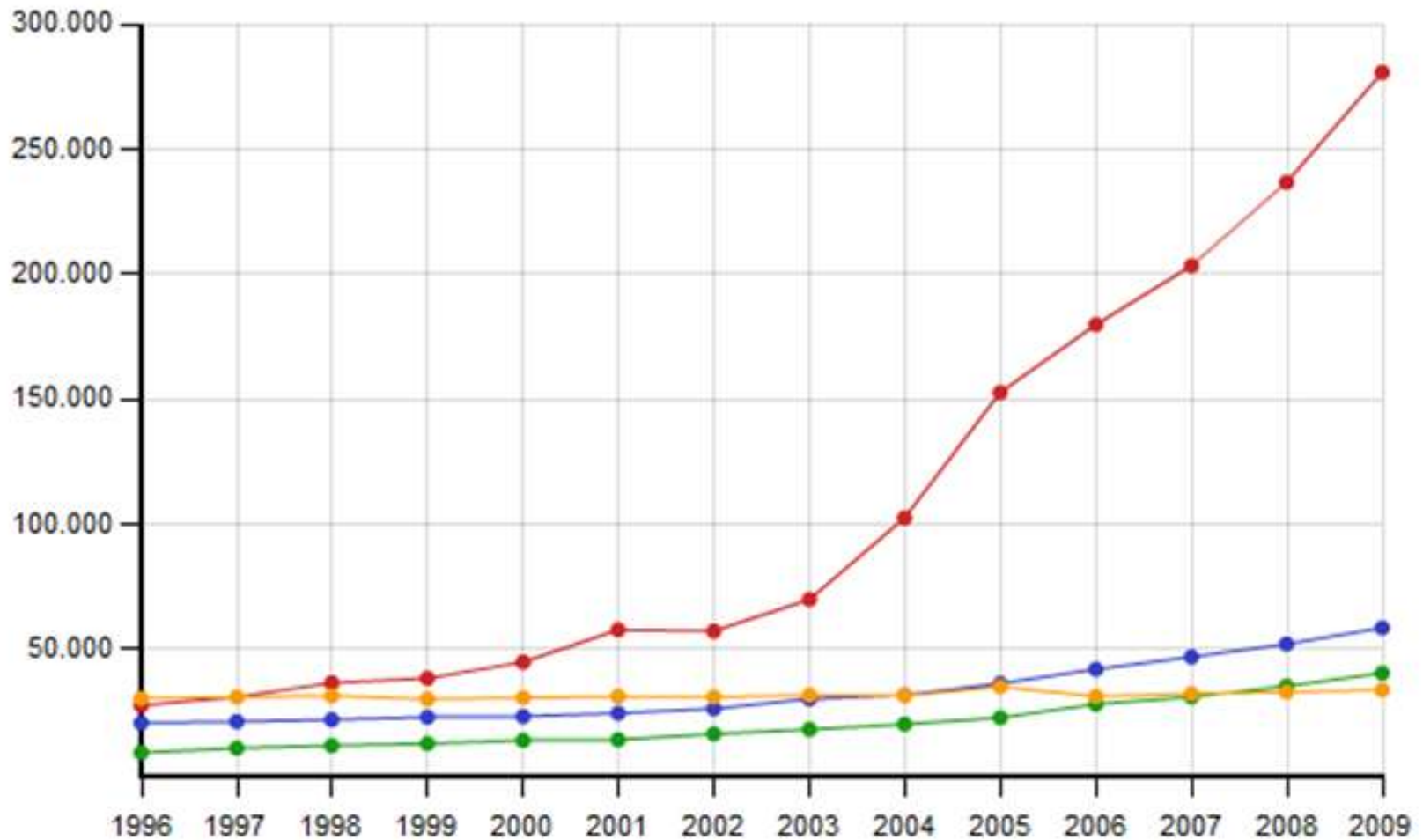


# Crescimento das Publicações Científicas

Fonte: TR InCites, 2013



# Publicações Científicas -



✓ Brazil

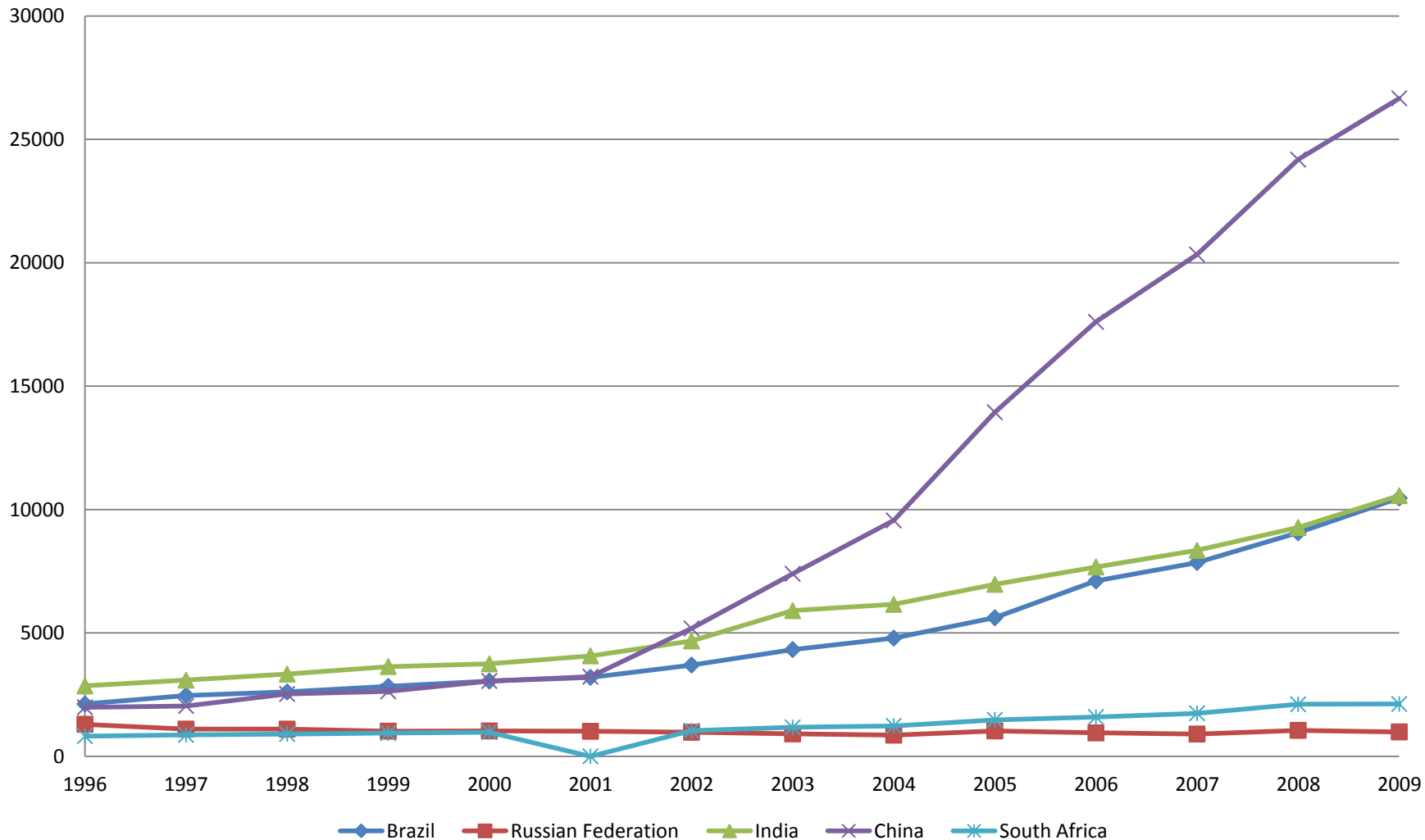
✓ China

✓ India

✓ Russian Federation

# Publicações Científicas - BRICS

## Medicina



# Sistema de Pós-graduação

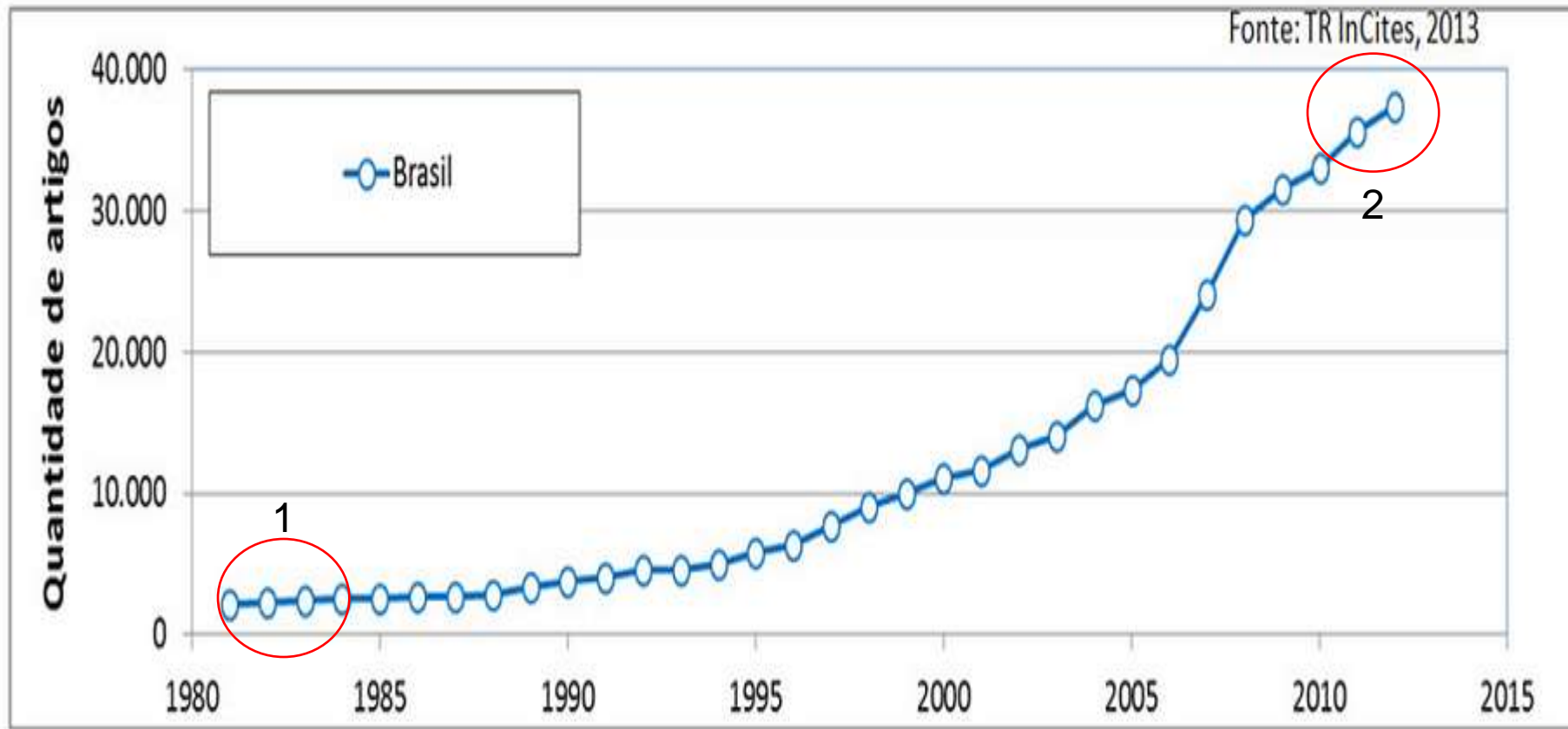
- Formar Professores
- Formar Pesquisadores
- Avançar os estudos Profissionalizantes

Parte do Sistema Científico e Tecnológico

# Avaliação da PG

Pela inexistência de outros sistemas de avaliação abrangentes, a avaliação da PG transformou-se no principal instrumento de avaliação científica no país

# Crescimento das Publicações Científicas



- Momento 1 – Estimular o Crescimento da Produção Científica
- Momento 2 – Avaliar os Efeitos/Impactos da Produção Científica



- Principal Erro – ter mantido um sistema de avaliação por mais de 30 anos com mudanças que não acompanharam as mudanças ocorridas no objeto da avaliação

# Outros Problemas

- Efeito “Estudar para passar”
- Reduz autonomia das Universidades –  
Contem a diversidade

# Ciência e Avaliação

- Apesar de nem sempre oferecer soluções imediatas para problemas relevantes das sociedades humanas, existe um crescente entendimento da importância das ciências no mundo contemporâneo, mesmo nas sociedades ditas em desenvolvimento.
- Crescente participação nos investimentos públicos

# Razões Para Avaliar em Ciência

- Conhecimento da Situação – Estimular o Desenvolvimento Científico
- Ranqueamento (selecionar os melhores) (Indivíduos/Grupos/Instituições)
- Planejamento-Gestão-Alocação de Recursos
- Conhecimentos sobre os Efeitos/Impactos

# Ciência

- “Science is our best effort to learn from experience, but it remain unclear how experience can deliver knowledge”
- (Broadbent, 2014)

# 10 types of Scientist – not all science jobs are the same

(Research Council-UK)

- Explorer
- Investigator
- Developer/Translational
- Service provider/operational
- Monitor/regulator
- Entrepreneur
- Communicator
- Teacher
- Business/Marketing
- Policy maker

# Avaliar os Efeitos/Impactos da Produção Científica

- Bibliométricos – efeitos na dinâmica do conhecimento
- Não Bibliométricos – efeitos “sobre a sociedade” (“societals”)

# As Bases Bibliográficas

- Para facilitar a sua organização e localização, estes artigos passaram a ser indexados em sistemas bibliográficos (recentemente adicionaram-se os mecanismos de busca, a exemplo do Google Acadêmico).
- Mais tarde aparece uma outra possibilidade que seria a de registrar não somente os artigos, mas também aqueles artigos que foram citados.



# Fontes usadas para medir citações

(calcular Fator de Impacto, índice-h etc)

- ISI WEB OF KNOWLEDGE
- SCOPUS
- GOOGLE ACADÊMICO

# Medindo o Mérito e a Excelência Científica - Emergência da CIENTOMETRIA

- Publicações
- Fator de Impacto das Revistas
- Citações (número; índices)
  
- As vantagens e os mitos da bibliometria – O uso ilimitado do Fator de Impacto e outros índices bibliométricos
- Enquanto tenham diferenças, são partilhados pelos diversos Campos Científicos
- A publicação científica e as mudanças do “open access”.

# A Publicação Científica

- Publico ou pereço! O quanto preciso publicar?
- Quero/Devo/Consigo publicar em revistas de alto impacto!!
- Em que língua publicar? Português, inglês ou .....?
- Como este Editor @&%\$#@ pôde rejeitar meu 'fantástico' artigo?

# A Publicação Científica

- Não há dúvida de que uma das similaridades mais marcantes entre todos os Campos Científicos é o fato de que a transmissão dos estudos realizados seja feita através de relatos escritos com a síntese do trabalho conduzido, incluindo os métodos utilizados, os resultados e as implicações destes.
- Estas publicações são feitas na forma de relatórios, livros e capítulos de livro e, mais frequentemente, de artigos publicados em revistas científicas.

# A citação

- Uma outra característica dos relatos científicos é o de citar outros relatos para construir relações com os conhecimentos que antecede

# Fator de Impacto

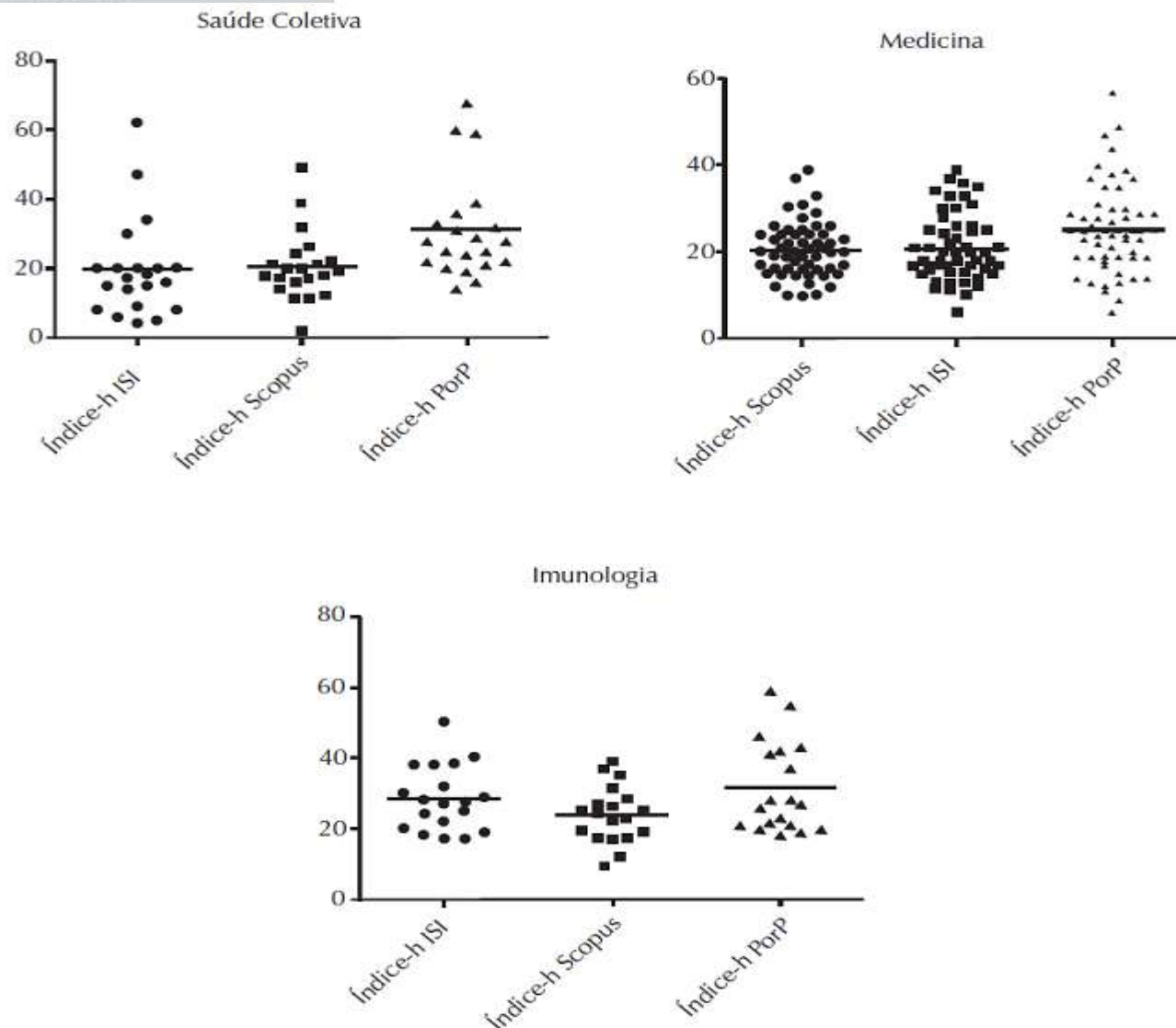
- Em termos matemáticos, em um dado ano o FI de um periódico é calculado como o número médio de citações dos artigos que foram publicados durante o biênio anterior. Por exemplo, o FI de um dado periódico em 2009 pode ser calculado como se segue:
- *sendo*  $A$  = o número de vezes em que os artigos publicados em 2007 e 2008 foram citados por periódicos indexados durante 2009
- *sendo*  $B$  = o número total de "itens citáveis" publicados em 2007 e 2008 ("itens citáveis": geralmente artigos, revisões, resumos de congressos ou notas, não sendo computados editoriais ou cartas ao editor)
- *então*, o **fator de impacto** de 2009 =  $A/B$

# Índice-h

- O **índice h**, ou *h-index* em inglês, é uma proposta para quantificar a produtividade e o impacto de pesquisadores baseando-se nos seus artigos (*papers*) mais citados.
- Em palavras, o **índice h** é o número de artigos com citações maiores ou iguais a esse número.
- Exemplo : um pesquisador com  $h = 5$  tem 5 artigos que receberam 5 ou mais citações; uma revista com  $h = 45$  tem 45 artigos entre os seus artigos publicados com 45 ou mais citações; e assim por diante.

Maurício Lima Barreto<sup>1,II</sup>Erika Aragão<sup>1,III</sup>Luis Eugenio Portela Fernandes de Sousa<sup>1,II</sup>Táris Maria Santana<sup>II</sup>Rita Barradas Barata<sup>IV</sup>

## Diferenças entre as medidas do índice-h geradas em distintas fontes bibliográficas e engenho de busca



**Figura.** Índices-h e medianas estimados nas bases *Web of Science*, *Scopus* e *Google Acadêmico* (calculado pelo *Publish-or-Perish*) de pesquisadores 1-A do Conselho Nacional de Pesquisa e Desenvolvimento Tecnológico do Brasil (CNPq) das áreas Saúde Coletiva, Medicina e Imunologia.



Maurício Lima Barreto<sup>III</sup>Erika Aragão<sup>IIII</sup>Luís Eugênio Portela Fernandes de Sousa<sup>I</sup>Táris Maria Santana<sup>II</sup>Rita Barradas Barata<sup>IV</sup>

## Diferenças entre as medidas do índice-h geradas em distintas fontes bibliográficas e engenho de busca

**Tabela 2.** Mediana dos índices-h de pesquisadores 1-A do CNPq das áreas da Saúde Coletiva, Medicina e Imunologia estimados em diferentes fontes (*Web of Science*, Scopus e Google Acadêmico) e (a) p-valores da comparação de diferentes fontes e (b) p-valores da comparação de diferentes áreas para cada fonte.

a) Fonte	Área	p <sup>a</sup>
	Saúde Coletiva	
<i>Web of Science</i>	17,0	0,008
Scopus	19,0	
Google Acadêmico	28,0	
	Medicina	
<i>Web of Science</i>	18,0	0,001
Scopus	20,0	
Google Acadêmico	24,5	
	Imunologia	
<i>Web of Science</i>	27,0	0,145
Scopus	24,0	
Google Acadêmico	27,0	
b) Áreas	Fontes	p <sup>a</sup>
	<i>Web of Science</i>	
Saúde Coletiva	17,0	0,001
Medicina	18,0	
Imunologia	27,0	
	Scopus	
Saúde Coletiva	19,0	0,157
Medicina	20,0	
Imunologia	24,0	
	Google Acadêmico	
Saúde Coletiva	28,0	0,120
Medicina	24,5	
Imunologia	27,0	

<sup>a</sup> Teste de Kruskal-Wallis

### ***General Recommendation***

1. Do not use journal-based metrics, such as Journal Impact Factors, as a surrogate measure of the quality of individual research articles, to assess an individual scientist's contributions, or in hiring, promotion, or funding decisions.

### ***For funding agencies***

2. Be explicit about the criteria used in evaluating the scientific productivity of grant applicants and clearly highlight, especially for early-stage investigators, that the scientific content of a paper is much more important than publication metrics or the identity of the journal in which it was published.
3. For the purposes of research assessment, consider the value and impact of all research outputs (including datasets and software) in addition to research publications, and consider a broad range of impact measures including qualitative indicators of research impact, such as influence on policy and practice.



13 de Maio 2013

### *For institutions*

4. Be explicit about the criteria used to reach hiring, tenure, and promotion decisions, clearly highlighting, especially for early-stage investigators, that the scientific content of a paper is much more important than publication metrics or the identity of the journal in which it was published.
5. For the purposes of research assessment, consider the value and impact of all research outputs (including datasets and software) in addition to research publications, and consider a broad range of impact measures including qualitative indicators of research impact, such as influence on policy and practice.

### *For publishers*

6. Greatly reduce emphasis on the journal impact factor as a promotional tool, ideally by ceasing to promote the impact factor or by presenting the metric in the context of a variety of journal-based metrics (e.g., 5-year impact factor, EigenFactor [8], SCImago [9], *h*-index, editorial and publication times, etc.) that provide a richer view of journal performance.
7. Make available a range of article-level metrics to encourage a shift toward assessment based on the scientific content of an article rather than publication metrics of the journal in which it was published.
8. Encourage responsible authorship practices and the provision of information about the specific contributions of each author.



13 de Maio 2013

9. Whether a journal is open-access or subscription-based, remove all reuse limitations on reference lists in research articles and make them available under the Creative Commons Public Domain Dedication [10].
10. Remove or reduce the constraints on the number of references in research articles, and, where appropriate, mandate the citation of primary literature in favor of reviews in order to give credit to the group(s) who first reported a finding.

***For organizations that supply metrics***

11. Be open and transparent by providing data and methods used to calculate all metrics.
12. Provide the data under a licence that allows unrestricted reuse, and provide computational access to data, where possible.
13. Be clear that inappropriate manipulation of metrics will not be tolerated; be explicit about what constitutes inappropriate manipulation and what measures will be taken to combat this.
14. Account for the variation in article types (e.g., reviews versus research articles), and in different subject areas when metrics are used, aggregated, or compared.



13 de Maio 2013

### *For researchers*

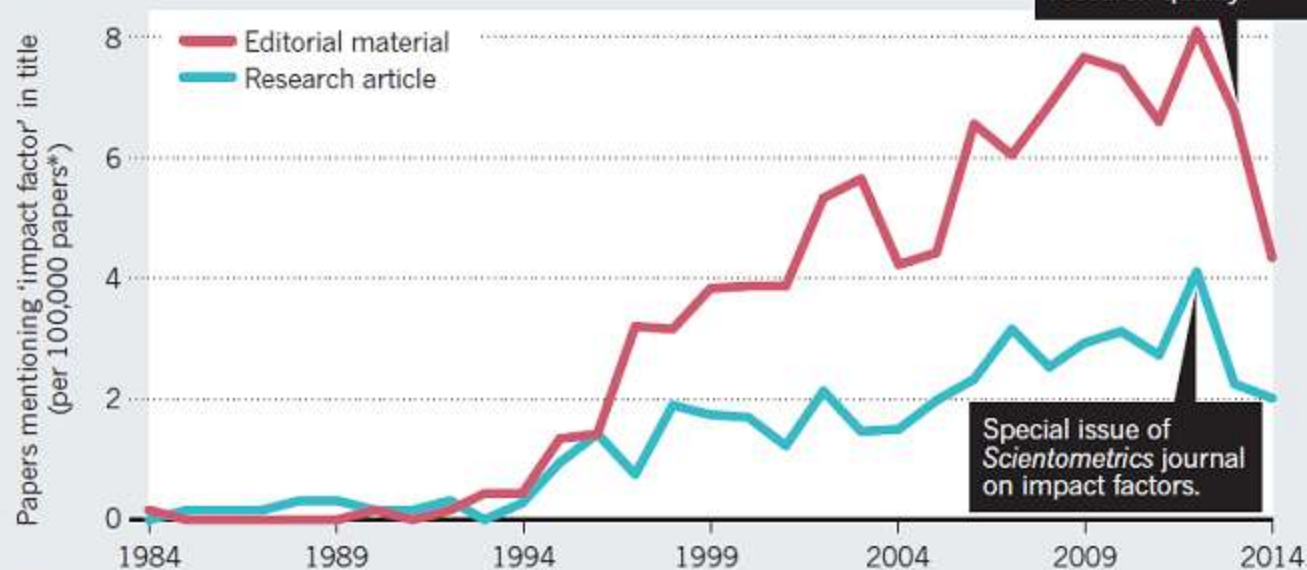
15. When involved in committees making decisions about funding, hiring, tenure, or promotion, make assessments based on scientific content rather than publication metrics.
16. Wherever appropriate, cite primary literature in which observations are first reported rather than reviews in order to give credit where credit is due.
17. Use a range of article metrics and indicators on personal/supporting statements, as evidence of the impact of individual published articles and other research outputs [11].
18. Challenge research assessment practices that rely inappropriately on Journal Impact Factors and promote and teach best practice that focuses on the value and influence of specific research outputs.

# The Leiden Manifesto for research metrics

## IMPACT-FACTOR OBSESSION

Soaring interest in one crude measure — the average citation counts of items published in a journal in the past two years — illustrates the crisis in research evaluation.

### 1 ARTICLES MENTIONING 'IMPACT FACTOR' IN TITLE



# The Leiden Manifesto for research metrics

1. **Quantitative evaluation should support qualitative, expert assessment.**
2. **Measure performance against the research missions of the institution, group or researcher.**
3. **Protect excellence in locally relevant research.**
4. Keep data collection and analytical processes open, transparent and simple.
5. Allow those evaluated to verify data and analysis.
6. **Account for variation by field in publication and citation practices.**
7. Base assessment of individual researchers on a qualitative judgement of their portfolio.
8. Avoid misplaced concreteness and false precision.
9. Recognize the systemic effects of assessment and indicators.
10. Scrutinize indicators regularly and update them

# The Metric Tide

Report of the Independent Review  
of the Role of Metrics in Research  
Assessment and Management

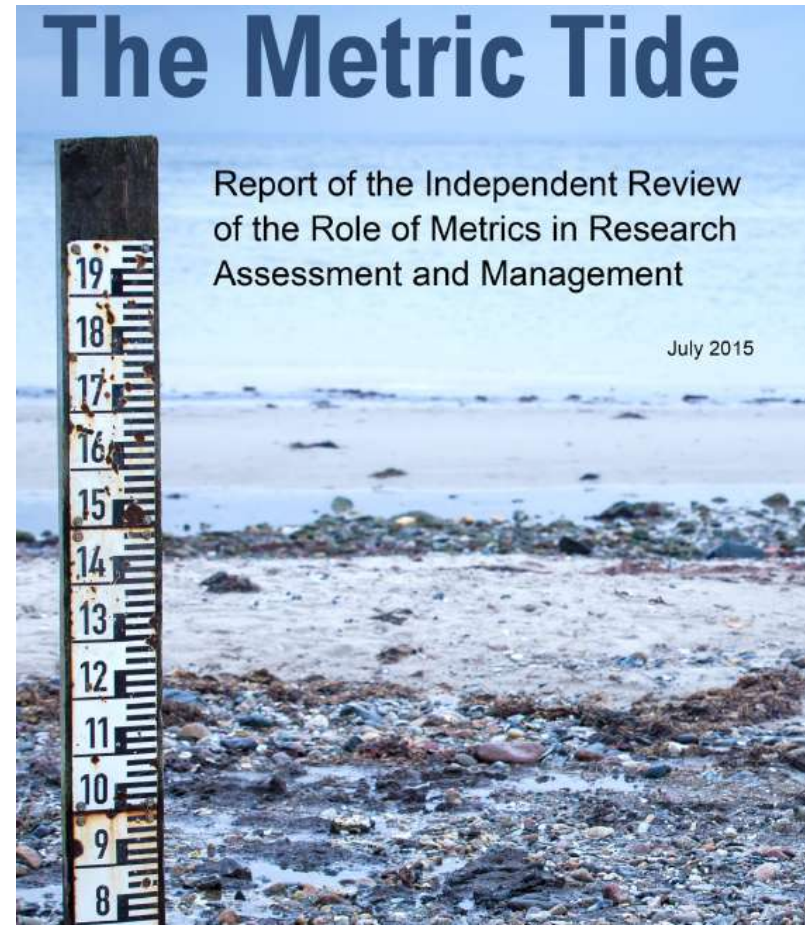
July 2015





# *The metric tide (A maré das métricas)*

“As métricas precisam ser escolhidas com cuidado e devem sempre complementar e apoiar o julgamento de especialistas, em vez de substituí-lo”,



# Recommendations

- The research community should develop a more sophisticated and nuanced approach to the contributions and limitations of quantitative indicators
- Data providers, analysts and producers of university rankings and league tables should strive for greater transparency and interoperability between different measurement systems.
- Publishers should reduce emphasis on journal impact factors as a promotional tool, and only use them in the context of a variety of journal-based metrics that provide a richer view of performance.
- There is a need for greater transparency and openness in research data infrastructure. A set of principles should be developed for technologies, practices and cultures that can support open, trustworthy research information management.
- The research system should take full advantage of ORCID as its preferred system of unique identifiers.
- .

# Recommendations

- Further investment in research information infrastructure is required.
- Research funders need to increase investment in the science of science policy.



Connecting Research  
and Researchers

## Open Researcher and Contributor ID

### What is ORCID?

ORCID is an open, non-profit, community-based effort to provide a registry of unique researcher identifiers and a transparent method of linking research activities and outputs to these identifiers. ORCID is unique in its ability to reach across disciplines, research sectors, and national boundaries and its cooperation with other identifier systems.

# Não Bibliométricos

(efeitos/impactos sobre a sociedade)

- Diferem entre os diferentes campos científicos
- Mais postulados do que demonstrados

## altmetrics: a manifesto

NO ONE CAN READ EVERYTHING. We rely on filters to make sense of the scholarly literature, but the narrow, traditional filters are being swamped. However, the growth of new, online scholarly tools allows us to make new filters; these altmetrics reflect the broad, rapid impact of scholarship in this burgeoning ecosystem. We call for more tools and research based on altmetrics.

As the volume of academic literature explodes, scholars rely on filters to select the most relevant and significant sources from the rest. Unfortunately, scholarship's three main filters for importance are failing:

- Altmetrics is the study and use of scholarly impact measures based on activity in online tools and environments. The term has also been used to describe the metrics themselves—one could propose in plural a “set of new altmetrics.” Altmetrics is in most cases a subset of both scientometrics and webometrics; it is a subset of the latter in that it focuses more narrowly on scholarly influence as measured in online *tools and environments*, rather than on the Web more generally.



# ResearchGate

- **ResearchGate is a social network site for academics to create their own profiles, list their publications, and interact with each other. Like Academia.edu, it provides a new way for scholars to disseminate their work and hence potentially changes the dynamics of informal scholarly communication.**
- “RG Score is calculated based on the publications in your profile and how other researchers interact with your content on ResearchGate”.
- “The RG Score takes **all** your research and turns it into a source of reputation.”

Benoît Godin  
and  
Christian Doré

**Table 2: Impact of Science**

**Science**

- Knowledge
- Research activities
- Training

**Technology**

- Products and processes
- Services
- Know-how

**Economy**

- Production
- Financing
- Investments
- Commercialisation
- Budget

**Culture**

- Knowledge
- Know-how
- Attitudes
- Values

**Society**

- Welfare
- Discourses and actions of groups

**Policy**

- Policy-makers
- Citizens
- Public programs
- National security

**Organisation**

- Planning
- Work organization
- Administration
- Human resources

**Health**

- Public health
- Health system

**Environment**

- Management of natural resources and the environment
- Climate and meteorology

**Symbolic**

- Legitimacy/credibility/visibility
- Notoriety

**Training**

- Curricula
- Pedagogical tools
- Qualifications
- Graduates
- Insertion into the job market
- Fitness of training / work
- Career
- Use of acquired knowledge



# Evaluating the Benefits from Health Research and Development Centres

*A Categorization, a Model and Examples of Application*

Hanney et al, Evaluation, 2000

- a) *Knowledge*
- b) *Benefits to future research and research use:*
  - i) the better targeting of future research;
  - ii) the development of research skills, personnel and overall research capacity;
  - iii) a critical capability to utilize appropriately existing research, including that from overseas;
  - iv) staff development/educational benefits.
- c) *Political and administrative benefits:*
  - i) improved information bases on which to take political and executive decisions;
  - ii) other political benefits from undertaking research.
- d) *Health sector benefits:*
  - i) cost reduction in the delivery of existing services;
  - ii) qualitative improvements in the process of service delivery;
  - iii) increased effectiveness of services, e.g. increased health;
  - iv) equity, e.g. improved allocation of resources at an area level, better targeting and accessibility;
  - v) revenues gained from Intellectual Property Rights.
- e) *Broader economic benefits:*
  - i) wider economic benefits from commercial exploitation of innovations arising from R&D;
  - ii) economic benefits from a healthy workforce and reduction in working days lost.

Figure 1. Categories of Payback

Source: Adapted from Buxton and Hanney, 1996

## Research Excellence Framework

The Research Excellence Framework (REF) is the new system for assessing the quality of research in UK higher education institutions.

The [results](#) of the 2014 REF were published on 18 December 2014.

REF2014  
Research Excellence Framework

The research of **154**  
UK universities was assessed

They made **1,911** submissions including:

- **52,061** academic staff
- **191,150** research outputs
- **6,975** impact case studies

The **overall quality** of submissions was judged, on average to be:

- ★★★★ **30%** world-leading (4\*)
- ★★★ **46%** internationally excellent (3\*)
- ★★ **20%** recognised internationally (2\*)

### REF 2014 - key links

2014 REF [Results and submissions](#)

[Evaluation of the 2014 REF](#)

[REF Manager's report](#) (March 2015)

[Panel overview reports](#) (Jan 2015)

[EDAP's report](#) on equality and diversity (Jan 2015)

[Key facts](#) leaflet about the REF

### REF impact case studies

A searchable online [database](#) and an initial analysis of [REF impact case studies](#) are available.

# Societal impact evaluation: Exploring evaluator perceptions of the characterization of impact under the REF2014

Gabrielle N. Samuel\* and Gemma E. Derrick

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*\*Corresponding author. Email: Gabrielle.samuel@brunel.ac.uk*

The relative newness of ‘impact’ as a criterion for research assessment has meant that there is yet to be an empirical study examining the process of its evaluation. This article is part of a broader study which is exploring the panel-based peer and end-user review process for societal impact evaluation using the UK’s national research assessment exercise, the Research Excellence Framework (REF) 2014, as a case study. In particular, this article explores the different perceptions REF2014 evaluators had regarding societal impact, preceding their evaluation of this measure as part of REF2014. Data are drawn from 62 interviews with evaluators from the health-related Panel A and its subpanels, prior to the REF2014 exercise taking place. We show how going into the REF exercise, evaluators from Panel A had different perceptions about how to characterize impact and how to define impact realization in terms of research outcomes and the research process. We conclude by discussing the implications of our findings for future impact evaluation frameworks, as well as postulating a series of hypotheses about the ways in which evaluators’ different perceptions going into an impact assessment could potentially influence the evaluation of impact submissions. Using REF2014 as a case study, these hypotheses will be tested in interviews with REF2014 evaluators post-assessment.

# Na Saúde Coletiva

- Diferenças bibliométricas e não bibliométricas entre as sub-áreas
- Epidemiologia
- Planejamento e Política
- Ciências Sociais

# Conclusão

- Devemos ter claro que a missão da pesquisa e dos pesquisadores deve ser o de contribuir para modificar o meio (seja social, econômico, cultural, ambiental) na qual vivemos e que a avaliação científica deve constituir-se em instrumento que nos ajude a entender como o trabalho científico está contribuindo com esta missão.



*Crédito de la imagen: Nerdilandia.com*

**26/10/15**

**Mauricio L. Barreto**

## De un vistazo



- Índices bibliométricos se vuelven fundamentales para evaluación científica y medición del impacto
- Pero poner peso de la evaluación en cuantificación de publicaciones y citas no es suficiente
- Urge idear nuevas medidas de evaluación y concebir fines no bibliográficos para actividad científica

# Conclusão

- Elaborar um novo modelo de avaliação científica é um grande empreendimento que muitos concordam que se faz necessário porem, até o momento está postulado, necessitando ser desenvolvido e testado.

# Futuro da Avaliação da PG

- Desejável que se mude!
- Será possível mudar?
- Que características deveria ter uma nova estratégia avaliativa?



**OBRIGADO!**