

Responsible Metrics: measuring social impact

ENPROP Conference

Chris James, Senior Product Manager, SciVal 13th November 2019

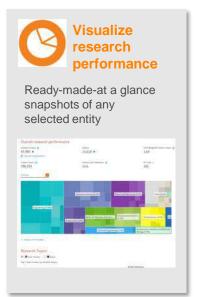
When used responsibly, research metrics aim to give a balanced, multi-dimensional view for assessing published research



- Worked for the past 15 years in the STM industry
- 2 years as a Senior Product Manager for our Research Metrics division
 - Launched CiteScore metrics
- 2 years as Senior Product Manager on SciVal
 - Big focus on the responsible use of metrics

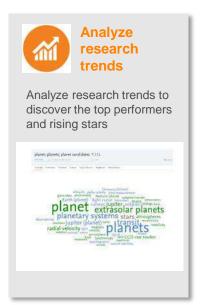
SciVal in a nutshell

SciVal offers quick, easy access to the research performance of over ~16,000 research institutions and 230 regions and countries





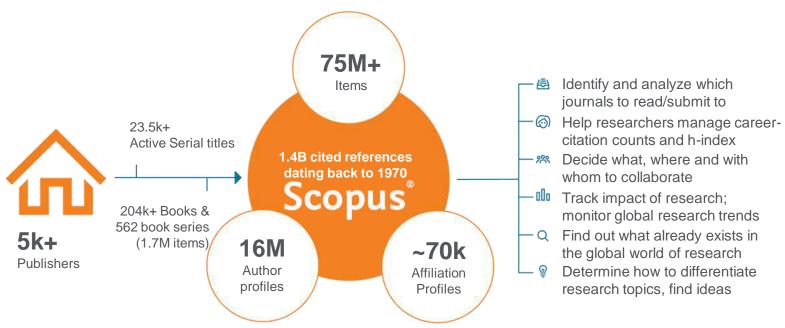




Using Scopus content from 1996

Scopus: the main data source for SciVal

Scopus is one of the largest curated abstract and citation databases of peer-reviewed literature, and features smart tools that allow you to track, analyze and visualize scholarly research.





- Listen closely to the research community's needs
 - Identify, review, develop and foster the use of rich and precise qualitative and quantitative indicators
- Robust, carefully-used indicators can help everyone make the most of the resources at their disposal to achieve their research aims
 - Smart indicators also help accurately showcase research impact to the global community

elsevier.com/icsr

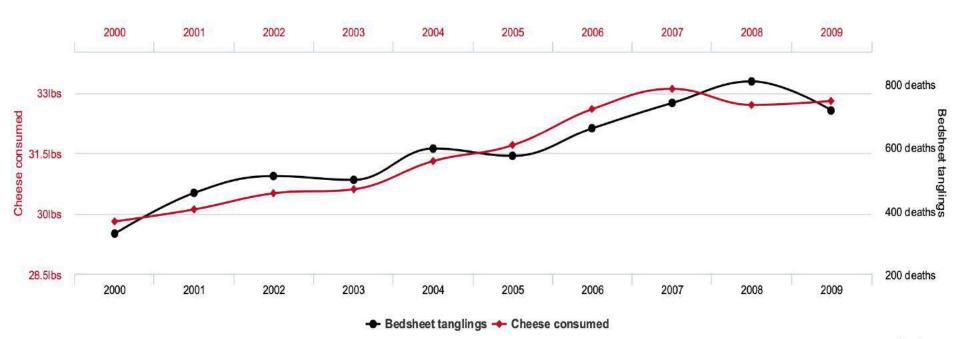
Just because data is more accessible to a broader audience, does not mean that they are sufficiently equipped to interpret what they receive



Per capita cheese consumption

correlates with

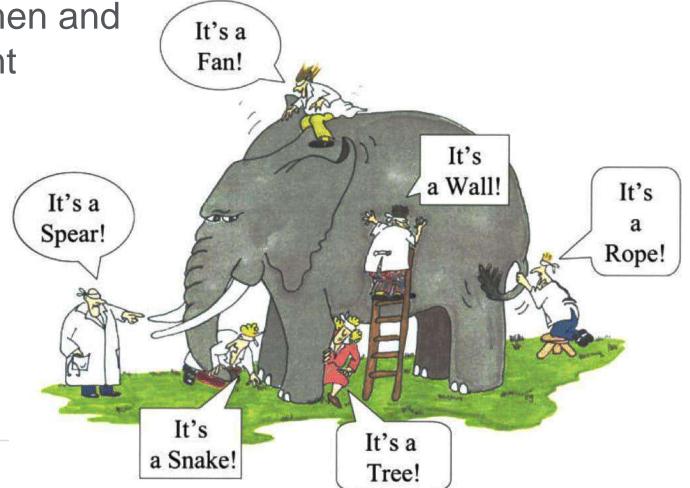
Number of people who died by becoming tangled in their bedsheets



tylervigen.com

The blind men and the elephant

It's all about perspective





Only by combining their perspectives can the blind men accurately describe an elephant



"When a measure becomes a target, it ceases to be a good measure."

Charles Goodhart, Problems of Monetary Management: The UK Experience, Papers in Monetary Economics, Reserve Bank of Australia, 1975.

"All metrics of scientific evaluation are bound to be abused."

Mario Biagioli, Watch out for cheats in citation game, Nature (2016) 535(7611):201.

How can we all use metrics more responsibly?

There are some simple rules



What are you trying to measure?



Evaluate performance

To understand

To monitor

The "Science of science" Plot progress against an objective

Demonstrate excellence

To show off

Market an entity on promo materials or grant app



Model scenarios

To compare

University rankings



Encourage change

- To reward
- To incentivise

A job, promotion, grant, prize or award Measurement of open access content submitted

Beware of the risks for different entities

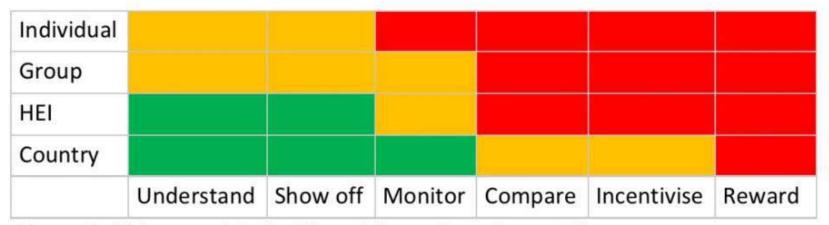


Figure 1. Risks associated with metric use in various settings

No real impact on entity

Be careful how you interpret

Use metrics with extreme care





Two Golden Rules for using research metrics

Always use both qualitative and quantitative input into your decisions

Always use more than one research metric as the quantitative input

Benefit from the strengths of both approaches. Don't replace one with the other

Combining both approaches = **closer to the whole story**

Valuable intelligence comes when these approaches **show different messages**

One metric's strengths can **complement** the weaknesses of others

There are many different ways of being excellent

Using multiple metrics drives desirable changes in behaviour (harder to game)

Example: importance of using multiple metrics - compensate for weaknesses

Field-Weighted Citation Impact = 2.53

with

Citations per Publication = 27.8

- ✓ Compensates for differences in field, type and age
- ✓ Meaningful benchmark is "built in" 1 is average for a subject area
- × People may not like small numbers
- x Complicated; difficult to validate
- No idea of magnitude: how many citations does it represent?

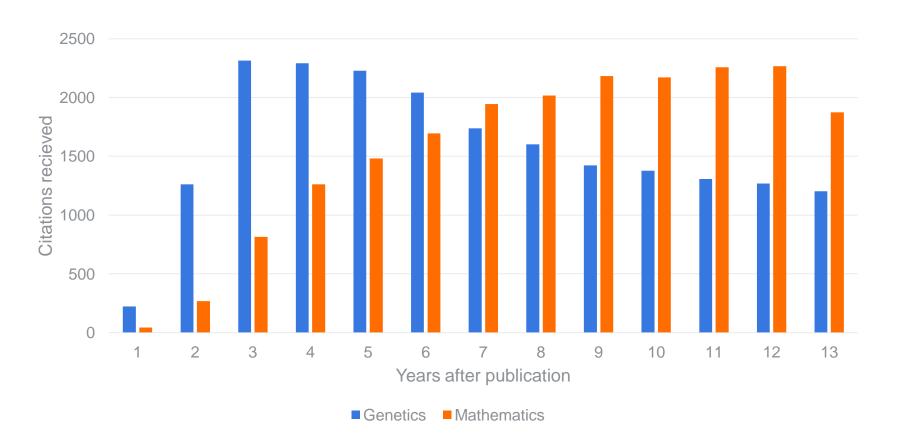
- ✓ Large number
- ✓ Simple, easy to validate
- ✓ Communicates magnitude of activity
- Affected by differences in field, type and age
- Meaningless without additional benchmarking

To use these rules effectively

we must know the limitations of these metrics



Differences in rates of citation



To compare across subject areas - FWCI

FWCI indicates how the **number of citations** received by an entity's publications compares with the **average number of citations** received by all other similar publications in the data universe.

Fact -

When looking at any entity, the FWCI is the **average** of all of the entity's publications

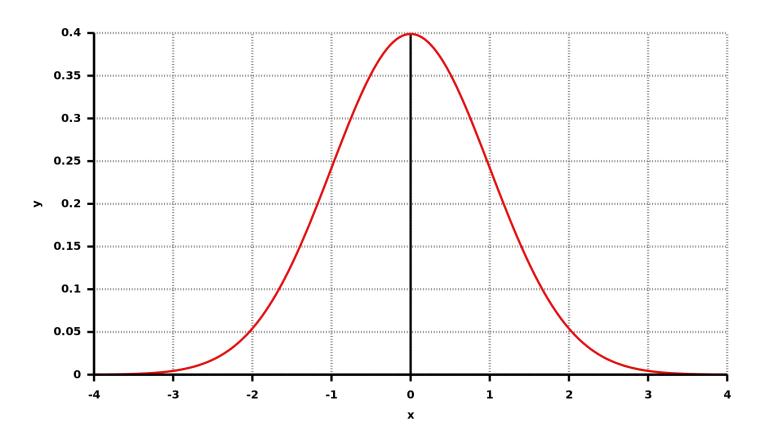


Averages work in nature, but beware with research metrics



Fruit fly: NOT ACTUAL SIZE

Normal distribution



Distribution of fruit fly body lengths

Statistic	Value (mm)
Mean	45.5
Median	45.5
Mode	45
Range	36 – 55
Standard deviation	3.9

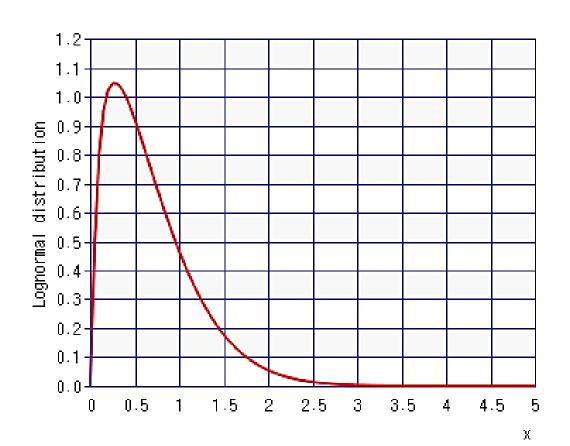


Distribution of citations to **Nature** 2008 papers

Statistic	Value
Mean cites per paper	275.1
Median	164
Mode	0
Range	0 – 4,735
Standard deviation	366.6



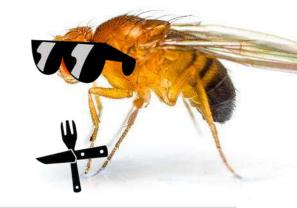
Typical skewed citation distribution



A thought experiment

What if we genetically modified fruit flies so that their body lengths distributed in the same pattern as citations?

- Most fruit flies would not exist (mode = 0)
- The vast majority of fruit flies (~80%) would be well "below average"
- The King of Flies would measure 1 metre and eat all the Feijoada in Rio





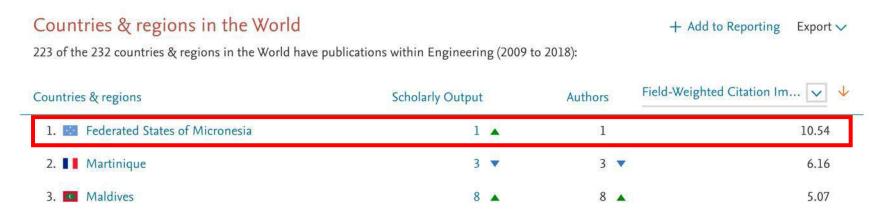
How can I use it responsibly?

Entity	Should I use FWCI?	Why not?	What should I watch out for?
A Researcher	No!	Small number of publications can be skewed by outliers	Outliers – Bill Gates / fruit fly effect!
A Group of Researchers	Maybe	No, if number of publications is small	Outliers & Date Ranges
Research area for a country	Depends on the size of the submission	No, if number of publications is small	Outliers & Date Ranges & Coverage



An example of misinterpretation due to small numbers

 Did you know that the Federated States of Micronesia is the most impactful country in the World in the field of Engineering?

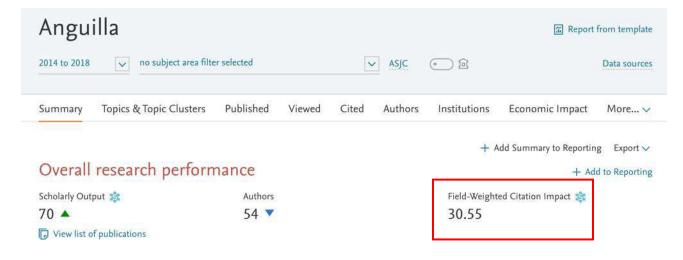


We cannot derive conclusions with such small numbers.



Also beware of statistics based on large numbers of authors

- 'Hypercollaborative' co-authorship is when there are hundreds or thousands of co-authors
- May be a consequence of the rise 'Big Science' a term used to describe research that requires major capital investment
- Effects are particularly visible for small countries



- Remove 28 pubs with +100 co-authors
- FWCI = 0.55

But it's not all bad!

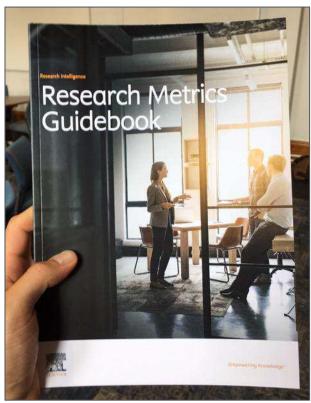
Used responsibly, metrics can give valuable insights



Metrics providers are giving guidance



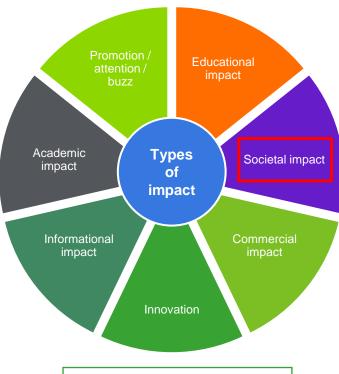
- Understanding the metrics
- Selection of appropriate metrics
- For each metric
 - Situations in which they are useful
 - When to take care and how to address short-comings
 - Worked examples



Research metrics could help demonstrate a lot

 Social media metrics (Shares, likes, +1, Tweets)

- Downloads from Github, RePEc, IRs
- Citations (field normalised, %iles, counts)
- Collaborators on Github
- Full text, pdf, html views on ScienceDirect, Figshare etc



Number of patents filed and granted

- Number of Library holdings (WorldCat OCLC)
- Views on Slideshare
- Plays on YouTube
- Amazon book reviews

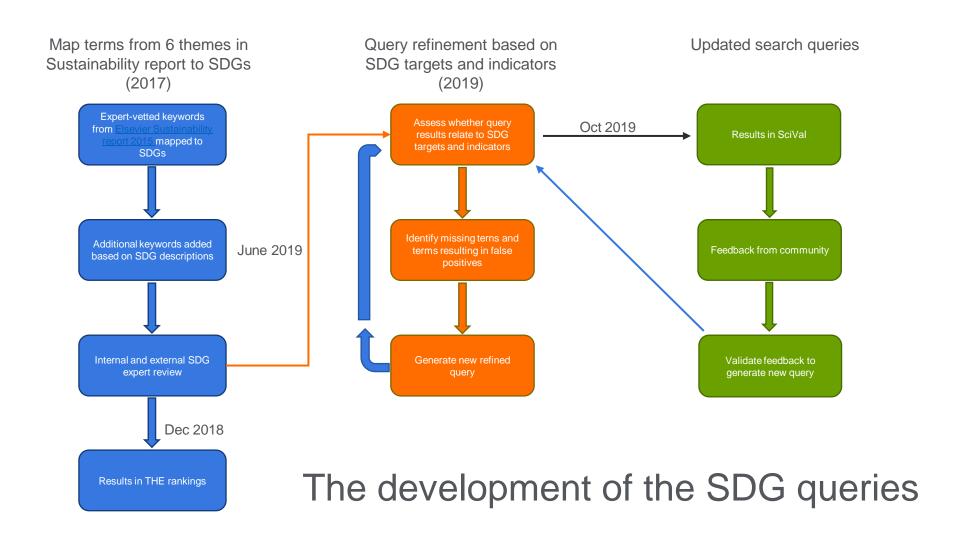
- Clinical citations or Health policy/guideline citations
- Government policy citations
- News mentions

- Patent citations
- Academic: Industry partnerships
- Licenses
- Business consultancy activities

- Wikipedia citations
- Blog mentions
- StackExchange links

Sustainable Development Goals - SDGs

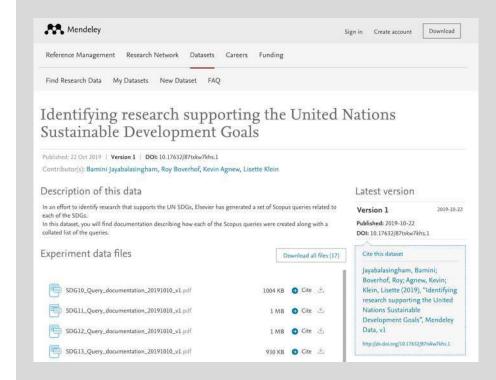




SDG queries are transparent

On Mendeley data we have uploaded:

- The full Scopus query for each SDG
- The query development methodology documentation for each SDG
- Download them for free from Mendeley: http://bit.ly/sdgdocs





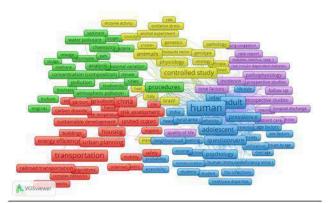
SDG11: Make cities and human settlements inclusive, safe, resilient and sustainable

SUMMARY

Original search string: 544,657 document results

TITLE-ABS-KEY((city OR cities OR {human settlement}) OR {human settlements} OR gentrification OR congestion OR transportation OR {public transport} (OR urban OR metropoli* OR town* OR municipal* OR housing OR slum* OR urbani?ation OR {sendai framework}) OR {Disaster Risk Reduction}) OR {DR} (DRR) OR {smart village}) OR {publishing} OR {publishing}) OR {publishing} OR {publishing}) OR {publishing} OR {publishing} OR {publishing}) OR {publishing} OR {publishing}) OR {publishing} OR {publishing}) OR {publishing} OR {publishing} OR {publishing}) OR {publishing} OR {pu

Graphical summary of co-occurrence of terms from 2000 randomly selected results:



Second update search: 112,527 document results

TITLE-ABS-KEY (I city OR cities OR (human settlement) OR (human settlements) OR urban OR metropoli* OR town* OR municipal*) AND (gentrification OR congesti on OR transportation OR (public transport) OR housing OR slum* OR (sendai framework) OR (Disaster Risk Reduction) OR (DRR) OR (smart city) OR (smart cities) OR (resilient building) OR (resilient buildings) OR (sustainable buildings) OR (buildings) OR (sustainable buildings) OR (buildings) OR (political service) OR (political

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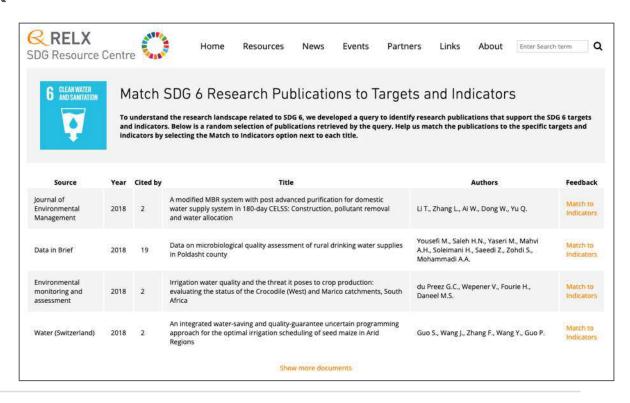
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SDG Feedback

We'll gather feedback in 2020 to improve the SDG queries.

- Work with subject matter experts
- Gather feedback via a website:
- Likely to follow the pilot done on SDG 6:

https://sdgresources.rel x.com/feedback

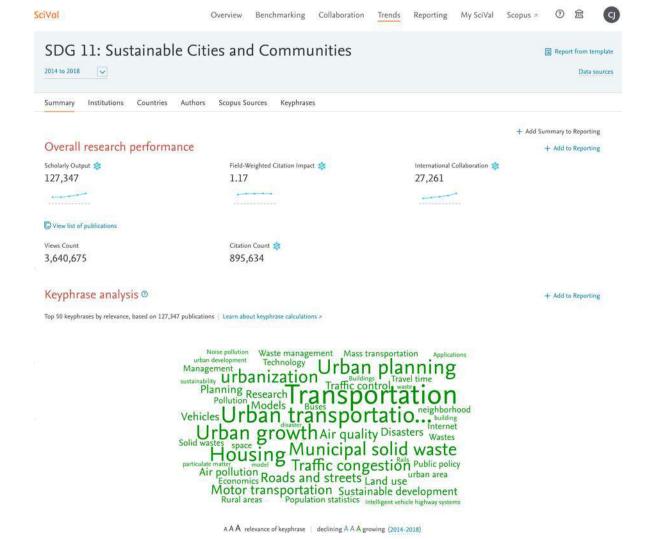




In the meantime, the SDG queries are available in SciVal

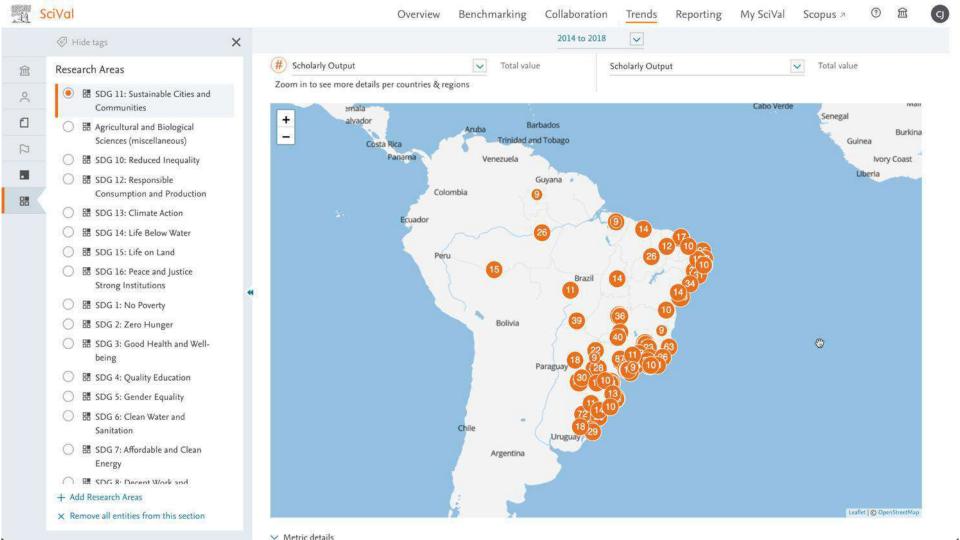
And here are some of the things you can do with them





		2014 to 2018	~	
, _	Countries & territories	Scholarly Output 🍑	Citations per Publication >	Field-Weighted Citation Impact >
	Countries & territories	Output 🗸		Situation in pass
1.	China	25,790	8.0	1.15
2.	United States	22,700	10.4	1.60
3.	** United Kingdom	8,117	11.3	1.94
4. 🔲	■ ■ Italy	6,743	9.7	1.73
5.	≖ India	6,485	5.0	0.93
6.	Australia Australia	5,146	11.6	1.80
7.	Spain	5,056	10.7	1.55
8.	Germany	4,845	10.5	1.69
9.	• Canada	4,752	10.7	1.63
10.	⊗ Brazil	4,145	5.3	0.84
11.	■ France	3,887	8.6	1.42
12.	Japan	3,836	6.0	0.97
13.	Netherlands	2,985	12.7	2.07

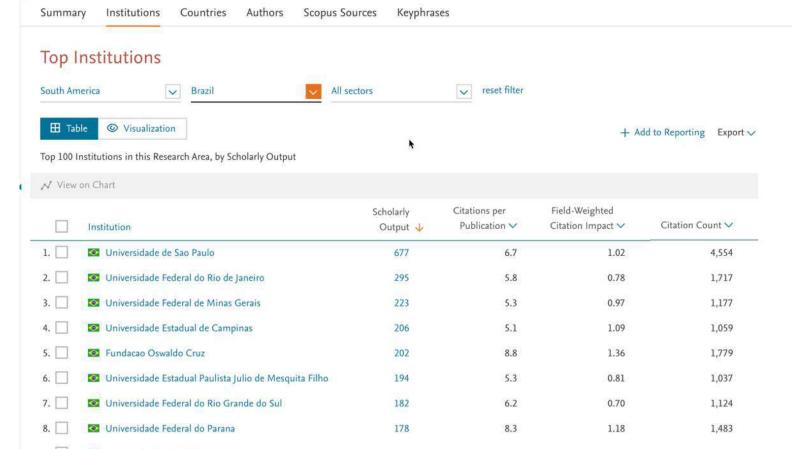




SDG 11: Sustainable Cities and Communities 2014 to 2018

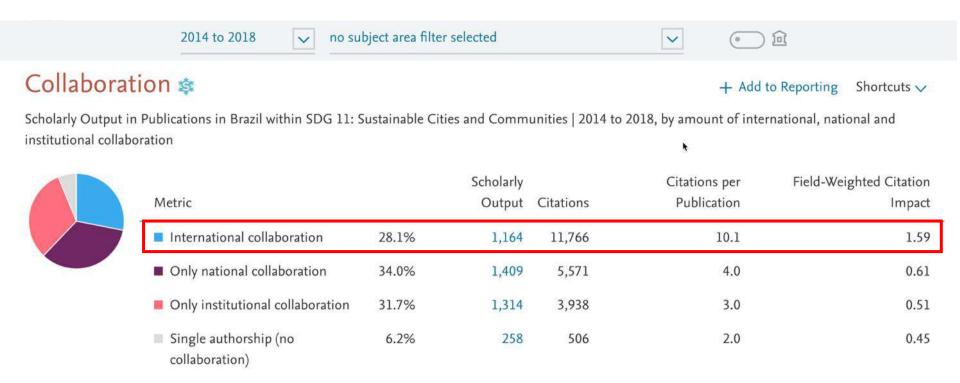
Report from template

Data sources

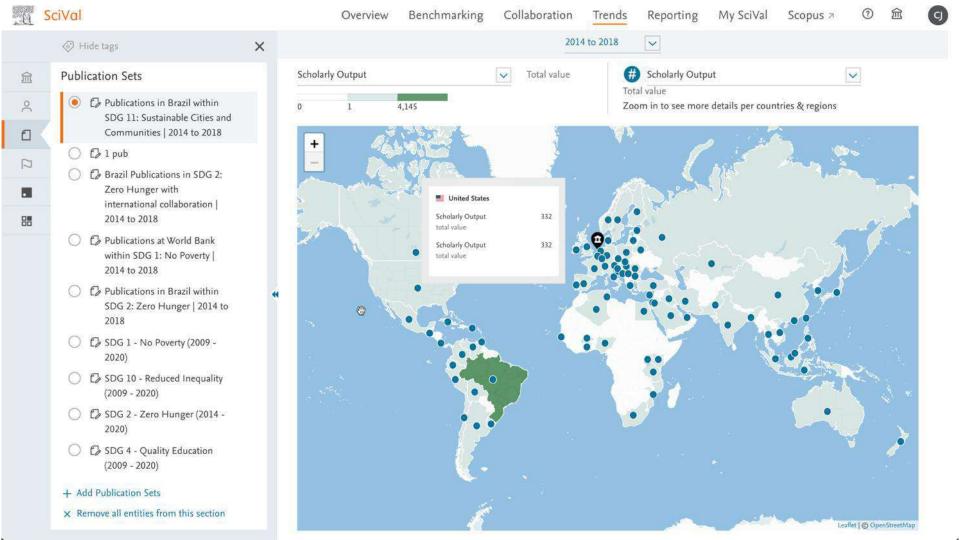


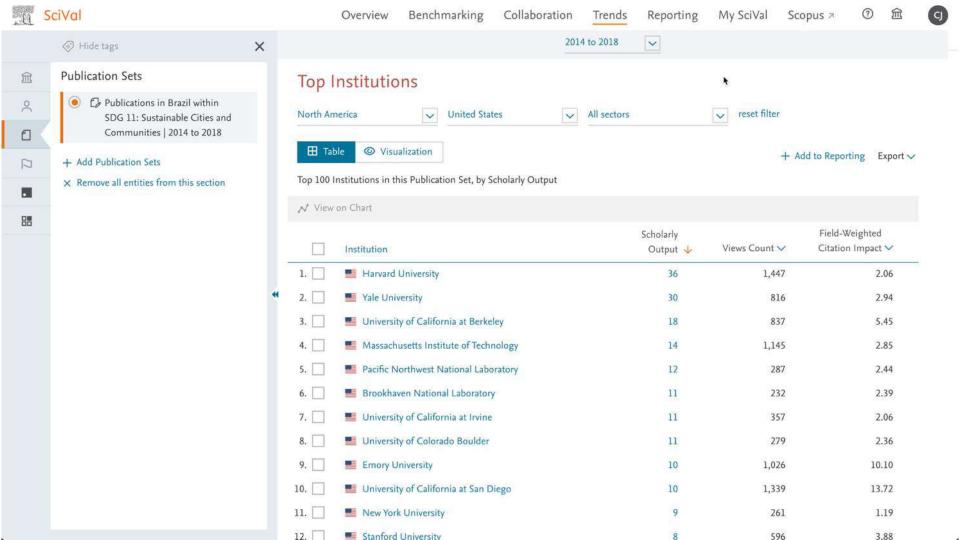


International collaboration impact



It's more effective to strengthen existing impactful collaboration





New Report - Cocktail today (4 pm)

International Collaboration of all Brazilian institutions + specific information on the Brazilian Institutions in the Capes PrInt Project.



Research in Brazil towards International Collaboration

Research output, impact and levels of collaboration of Brazilian Institutions that are part of the Print Project



Summary

- Understand what you are trying to measure and the potential implications
- Understand the limitations of the metrics you are using as a measure
- Apply the Two Golden Rules
- Be transparent and open to those you are measuring
- Join us for cocktails there's time before the game!



@			
Flamengo	vs	Vasco da Gama	
LINEUPS	STATS	NEWS	
Flamengo	Draw	Vasco da Gama	
69%	21%	10%	





Obrigado

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