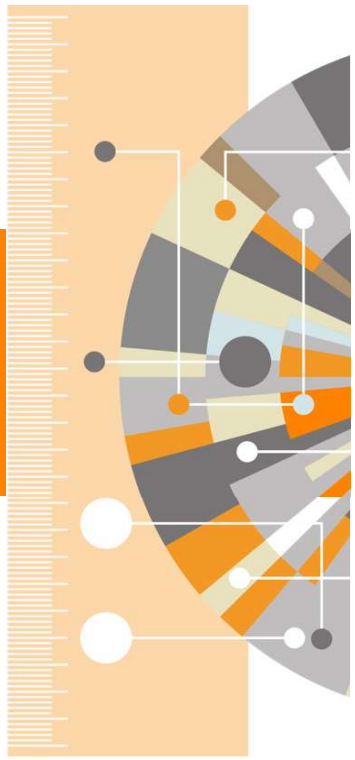
Elsevier Research Intelligence

Evaluating research competitiveness using metrics



Dr Lisa Colledge, Director of Research Metrics

26 October 2016

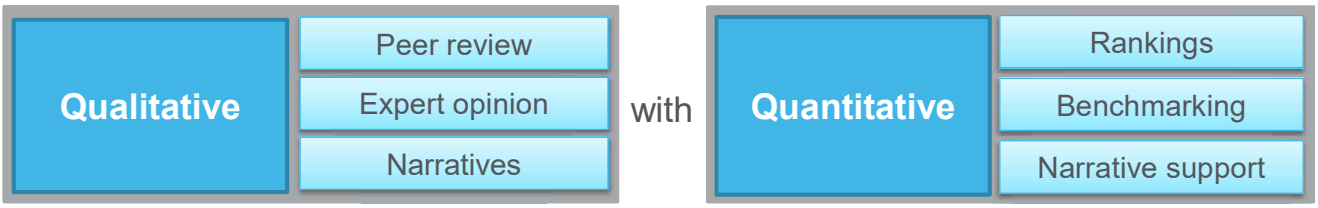
Empowering Knowledge

Agenda

- The importance of research metrics
- Overview of types of research metrics
- Recommendations for measuring research competitiveness
- Trends in the use of research metrics
- Elsevier's role and focus

The importance of research metrics

- **Research metrics help us to make better decisions**
  - More informed
  - Reduce chance of error
- Metrics are **responsive to changes in performance**
- Metrics **enable benchmarking** even against peers we don't know
- Metrics can **save time and money**, if used wisely to indicate where peer review should be used for validation
- Metrics are an **objective complement to expert opinion**
  - Both approaches have strengths and weaknesses
  - Valuable information is available when these approaches differ in message
  - **Always use both approaches in combination**



Metrics are only valuable when used responsibly

- **Always use more than 1 research metric**
  - A strong research ecosystem produces and recognizes diverse types of impact
  - Reduces the chance of gaming
  - Reduces the chance of driving undesirable changes in behaviour
- **Select metrics that represent behaviour you want to encourage**
- **Data source coverage, disciplinary focus, and timeline** should affect the metrics selected
- Select a set of metrics whose **strengths complement each others' weaknesses**

A useful metric's weaknesses can be compensated for by using it with another metric

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" – 253% of expected
- × People may not like small numbers
- × 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

A basket of research metrics

Qualitative input e.g. peer review

Facet	Theme	Metrics in areas of
Funding	**Awards** Can I support my research?	Number, value and duration of awards
Outputs	**Productivity** How productive am I?	Number, types and growth of outputs
	Visibility How prominent is my output in top outlets?	Impact of publication outlets
Research Impact	**Influence** How is my output used in academia?	Views, citations Reputation: awards, prizes, editorships
	Enterprise How is my output used in industry?	Commercial use (patents, licenses, spin outs, consultancy)
Engagement	**Network** How well linked am I within academia?	Collaboration: geographical, cross-disciplinary Network: number of collaborators, centrality, connectedness, geographical extent
	Connections How well linked am I outside academia?	Collaboration: cross-sector Celebrity: who's talking about me? Crowd-sourcing: collect and analyze data, raise funding
	Mentoring How do I transmit knowledge?	Who supervised me, and who have I supervised?
Social Impact	**Social Impact** What is my wider impact?	Direct and indirect impact on general public's well being, and understanding of research

A basket of research metrics

Qualitative input e.g. peer review

Facet	Theme
Funding	**Awards** Can I support my research?
Outputs	**Productivity** How productive am I?
	Visibility How prominent is my output in top outlets?
Research Impact	**Influence** How is my output used in academia?
	Enterprise How is my output used in industry?
Engagement	**Network** How well linked am I within academia?
	Connections How well linked am I outside academia?
	Mentoring How do I transmit knowledge?
Social Impact	**Social Impact** What is my wider impact?

A selection of metrics, each answering a different need:
- Based on different types of data
- Includes both basic counts and sophisticated field-normalization

Basket of metrics must be available for multiple entities

Article | Researcher | Institution | Country
Journal | Book | Funder | Library
Research data | Subject area | Publisher

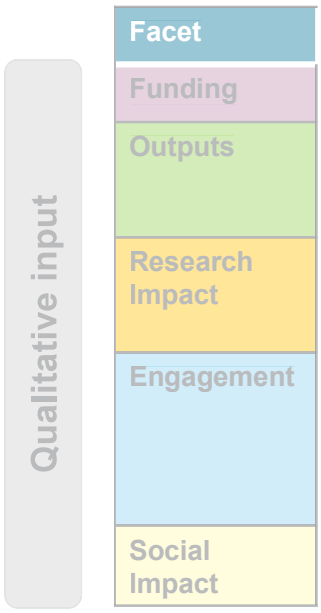
Qualitative input

Facet
Funding
Outputs
Research Impact
Engagement
Social Impact

Use the basket of metrics to rank or benchmark?

Characteristic	Ranking	Benchmarking
Example	Times Higher institutional ranking	SciVal
Use cases	Ranking	Evaluating, showcasing, scenario modelling
Metric selection	Fixed, independent of particular situation	Flexible, responsive to particular situation
Peer selection	All institutions meeting inclusion criteria	Flexible, responsive to particular situation
Nature of comparison	Absolute performance	Relative performance
Currency	Annual snapshot	Real-time
Manner of use of metrics	Aggregated metrics with weighted contributions	Individual, separate metrics custom selected for the question
Intended use	Public	Private within personal network

Benchmarking research competitiveness



Article | Researcher | Institution | Country
Journal | Book | Funder | Library
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Benchmarking works well when:

1. The question is clearly defined, so that
2. Appropriate metrics can be selected, and
3. Calculated for the entities whose performance you are investigating, and also
4. For suitable peers

Which metrics to benchmark research competitiveness? (1)

Qualitative input e.g. peer review

Facet	Theme
Funding	**Awards** Can I support my research?
Outputs	**Productivity** How productive am I?
	Visibility How prominent is my output in top outlets?
Research Impact	**Influence** How is my output used in academia?
	Enterprise How is my output used in industry?
Engagement	**Network** How well linked am I within academia?
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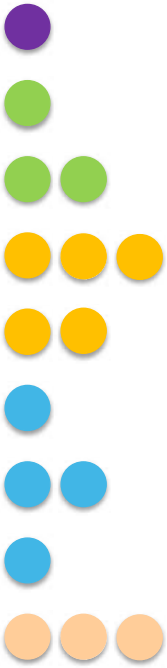
	Mentoring How do I transmit knowledge?
Social Impact	**Social Impact** What is my wider impact?



A selection of metrics from the basket to cover multiple facets and themes of importance to the exercise

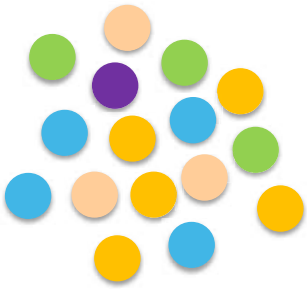
Number of metrics shown is indicative only

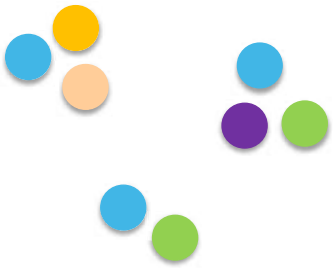
Which metrics to benchmark research competitiveness? (2)

A core set of metrics to be used by all institutions

+

Complementary sets of metrics for disciplines and institution types





Consider also different weightings per facet and theme per discipline and institution type

Number of metrics shown is indicative only

Metrics for Japanese language publications?

- Many existing metrics are suitable but the coverage of large data sources is not sufficient
- Any such metrics will need to draw on Japanese data sources
- There may be multiple sources e.g. at each institution

Recommendations

- Benchmarking is useful when it compares apples with apples, so it is important to **define Japanese language metrics unambiguously**
- **Test the metric definition** before finalising
- Work with a **group of Japanese experts** with local data sources
- Consider **validating the method with other countries** with local language considerations e.g. China, Germany, France

Trends in the use of research metrics

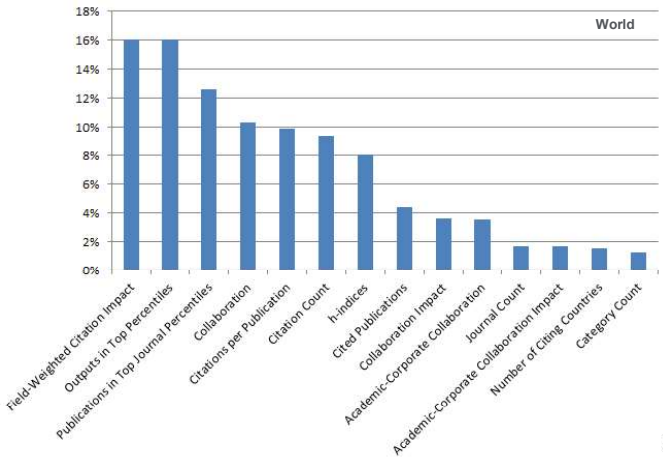
- **Practical expertise is growing from shared experiences**
  - Increasing use of research metrics
  - Increasing forums, expert groups, and discussions
- **All stakeholder groups are using metrics, not only bibliometricians**
  - Also concern when use of metrics is not declared openly
  - Resistance when evaluators are not transparent about metrics they use
- **Growing demand for a more diverse range of metrics**, especially
  - Social impact metrics
  - Alternative metrics
  - Metrics for articles and researchers

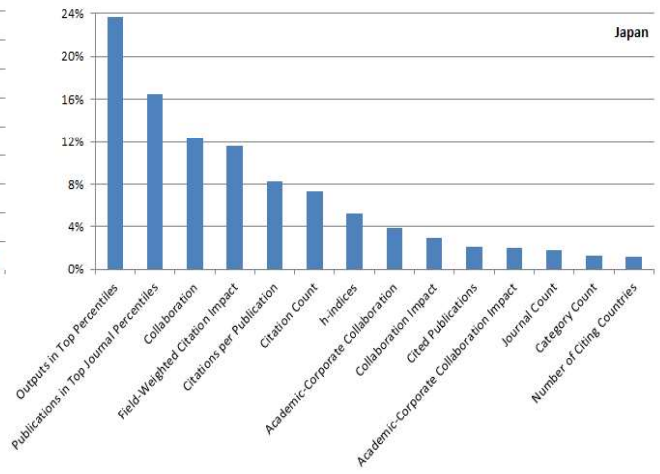
Elsevier's role in research metrics (1)

- **Practical expertise is growing from shared experiences**
  - Increasing use of research metrics
  - Increasing forums, expert groups, and discussions

Learn from the research community e.g. Snowball Metrics, user testing, surveys

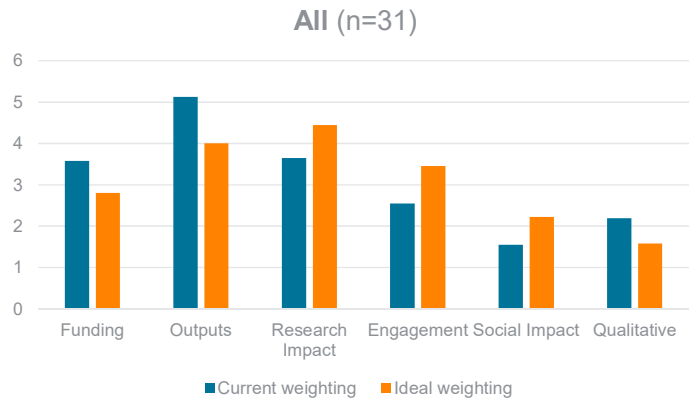
Usage statistics from SciVal Benchmarking module





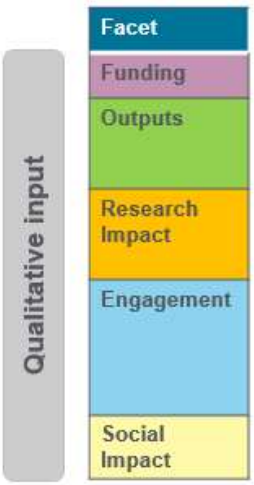
Usage from Benchmarking module from 11 March 2014 to 28 June 2015)
Scholarly Output it excluded since this is the default

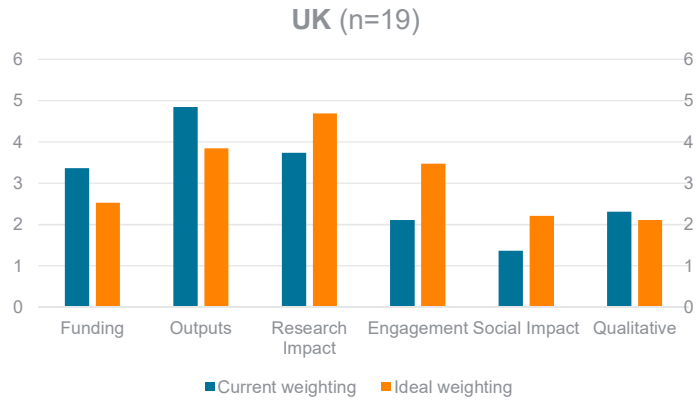
Survey: test the basket of metrics (national)

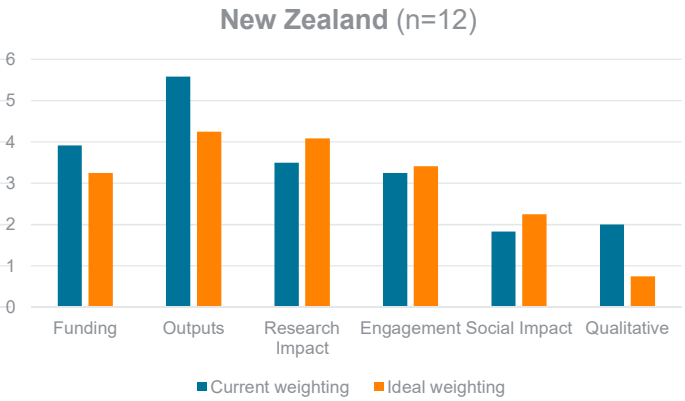


Relative importance now

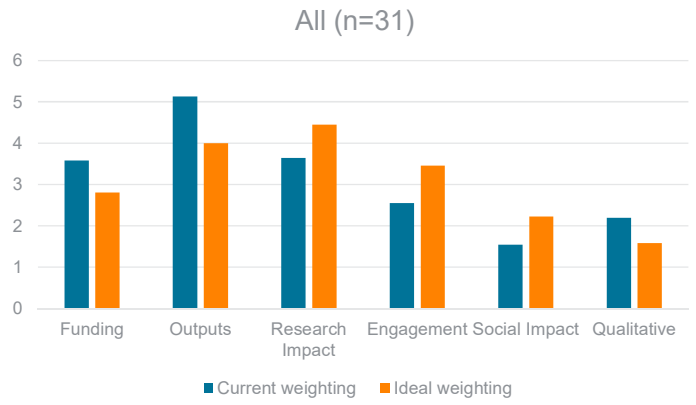
Relative importance if available inputs were not a limitation





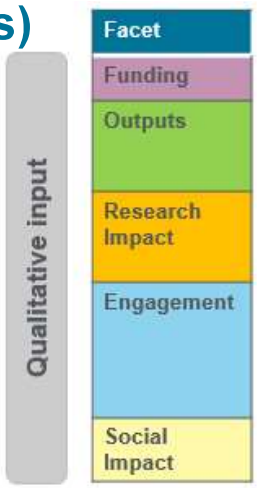


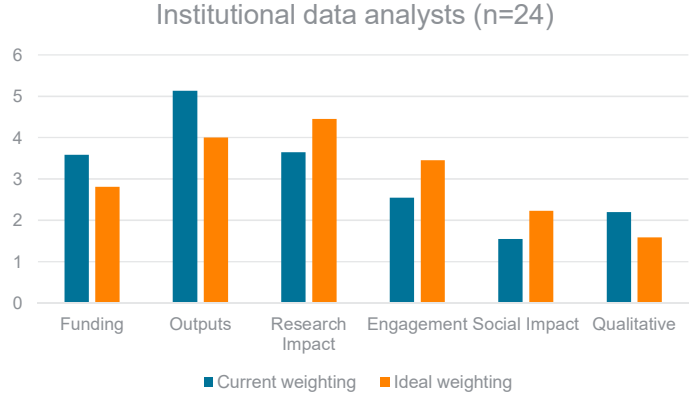
Survey: test the basket of metrics (stakeholders)

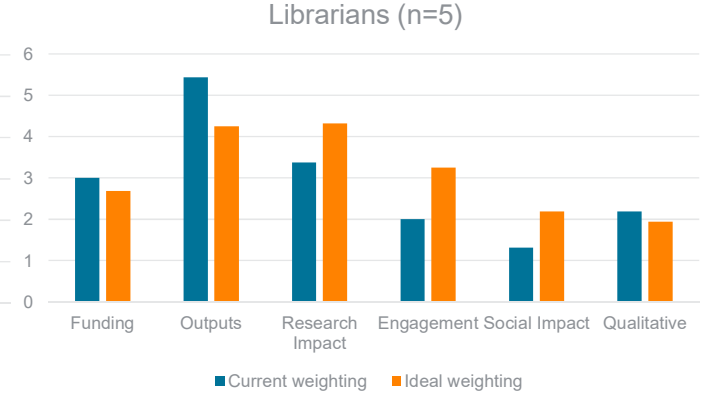


Relative importance now

Relative importance if available inputs were not a limitation







Elsevier's role in research metrics (2)

- **Practical expertise is growing from shared experiences**
- **All stakeholder groups are using metrics, not only bibliometricians**
  - Also concern when use of metrics is not declared openly
  - Resistance when evaluators are not transparent about metrics they use

Learn from the research community e.g. Snowball Metrics, user testing, surveys

We broadcast what we have learnt as simply as possible

We provide transparency to underlying data and about metrics "recipes"

Two Golden Rules of using research metrics give a balanced, multi-dimensional view

Always use both qualitative and quantitative input into your decisions

This is about benefitting from the strengths of both approaches, not about replacing one with the other

Combining both approaches will get you closer to the whole story

Valuable intelligence is available from the points where these approaches differ in their message

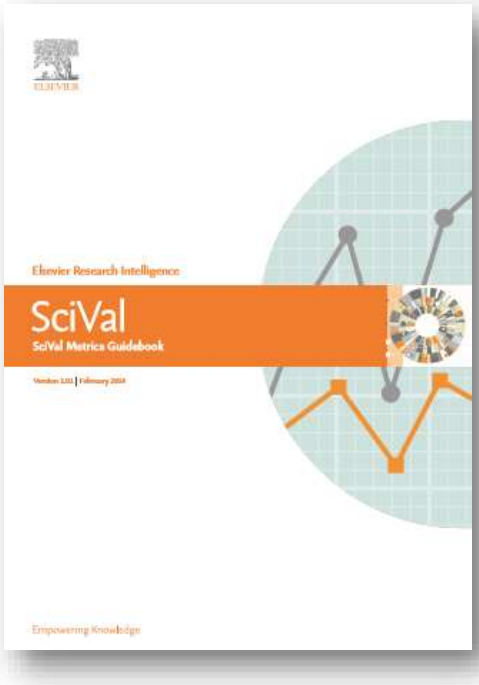
Always use more than one research metric as the quantitative input

A research metric's strengths can complement the weaknesses of others

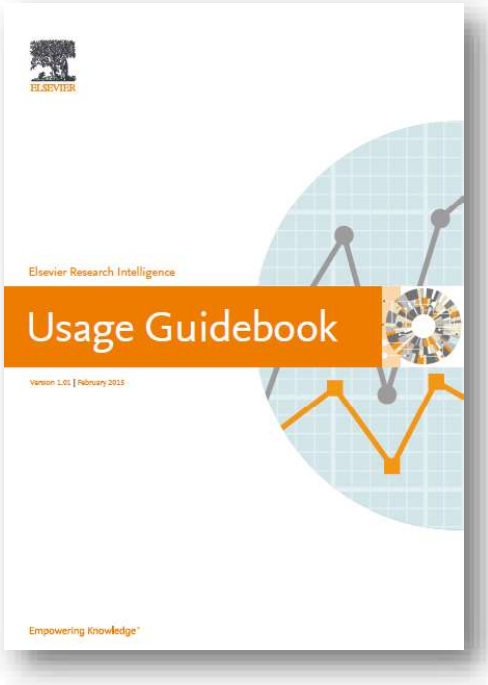
There are lots of different ways of being excellent

Using multiple metrics drives desirable changes in behaviour

Transparency by sharing the recipes of our metrics



https://www.elsevier.com/research-intelligence/resource-library/scival-metrics-guidebook



https://www.elsevier.com/research-intelligence/resource-library/usage-guidebook

Elsevier's role in research metrics (3)

- **Practical expertise is growing from shared experiences**
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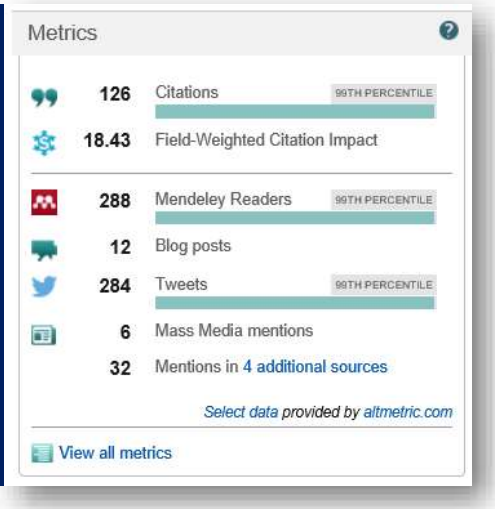
We provide transparency to underlying data and about metrics "recipes"

Investing in new data sources to support a broader range of research metrics

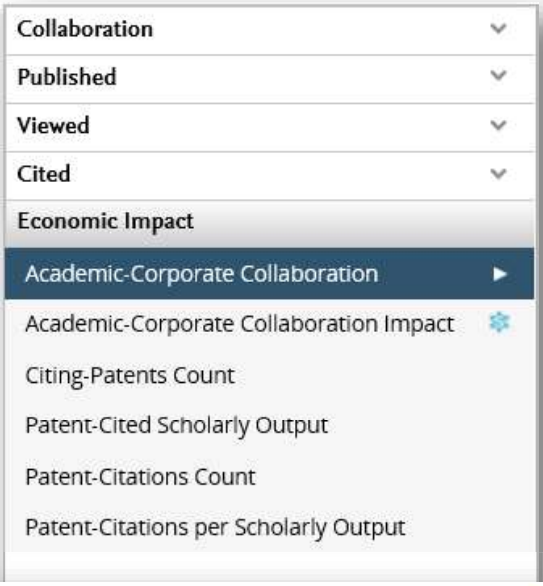
Continue to develop and champion traditional, familiar metrics e.g. journal, citation

Providing a broader range of research metrics

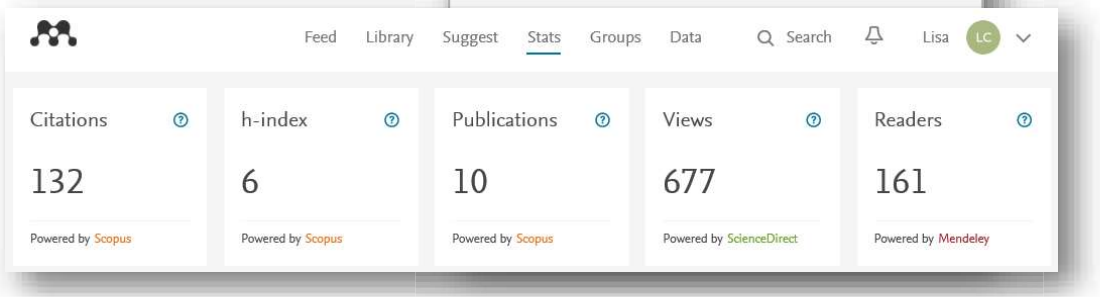
Article metrics in Scopus



Basket of metrics in SciVal

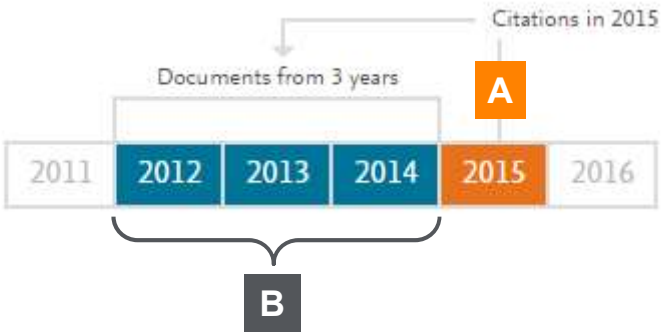


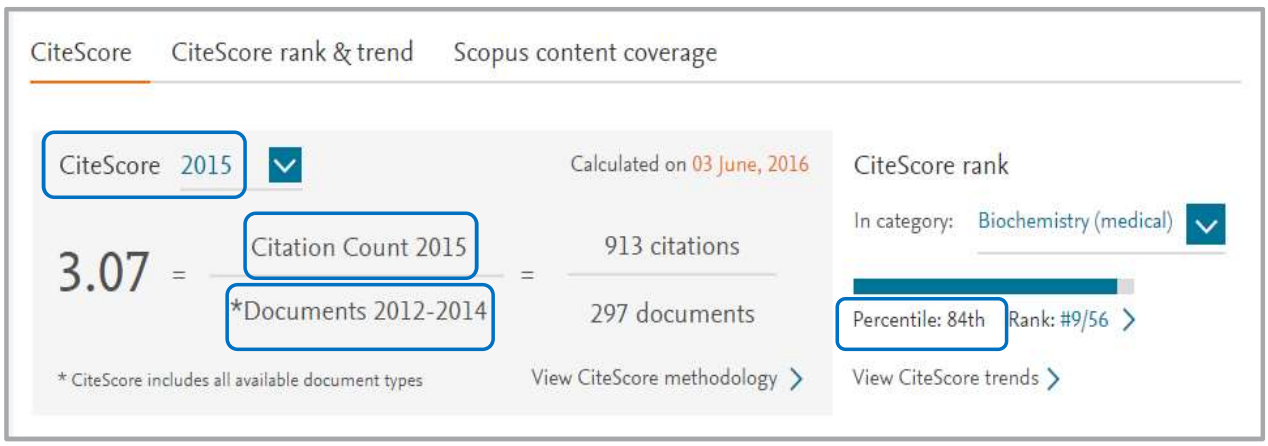
Researcher metrics in Mendeley



Journal metrics are still important in performance

CiteScore 2015 value = $\frac{A}{B}$





Partial screenshot from Scopus prototype; not yet final

Conclusion

- **Research metrics help us to make better decisions, if used responsibly**
  - Golden Rule 1: Always use both qualitative and quantitative input into your decisions
  - Golden Rule 2: Always use more than one research metric as the quantitative input
- **Successful benchmarking** relies on a clearly defined question, a selection of appropriate metrics benchmarked against suitable peers
- Suggest a **common core of metrics, with complementary sets** suitable for particular disciplines and institution types
- Test **Japanese language metrics** with a group of Japanese experts with their own data sources, and consider validating with e.g. China
- **Use new metrics alongside traditional metrics**, not instead of them