

Open Citations 101

Historical Background and Current Developments

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京都大学図書館機構

The Kyoto University Library Network



Current Developments of Open Citations
and Institutional Repository
20 May 2019 – Kyoto University Library
Kyoto, Japan



Acknowledgements

I prefer to thank all the people and collaborators behind this presentation and the Open Citations movement at the very beginning, since their contributions have been crucial for preparing what I am going to tell you in this talk

Here the list (in alphabetic order): Geoff Bilder, Jonathan Dugan, Martin Fenner, Ivan Heibi, Ginny Hendricks, Vincent Larivière, Jennifer Lin, Catriona MacCallum, Jo McEntyre, Daniel Mietchen, Cameron Neylon, Mark Patterson, David Shotton, Gianmarco Spinaci, Cassidy Sugimoto, Dario Taraborelli, Nees van Eck, Ludo Waltman... and apologies for any other I've forgotten to thank!

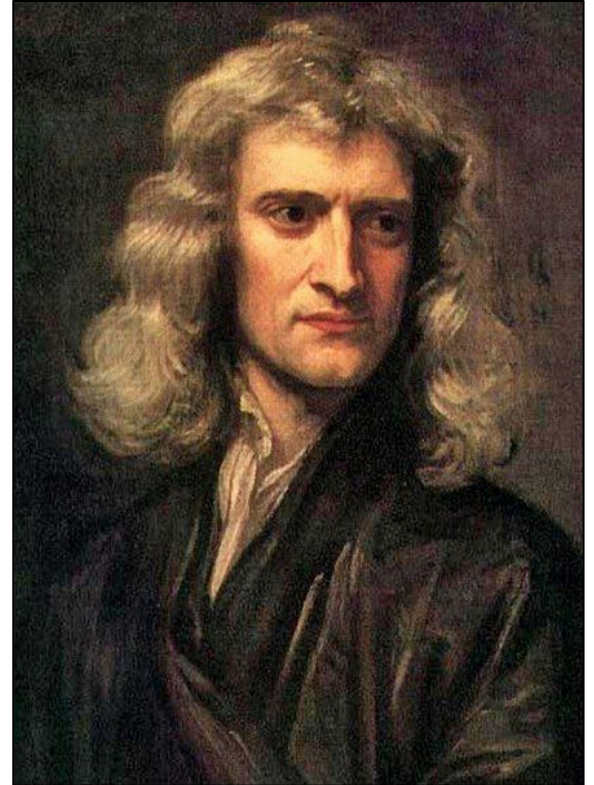
citations

To cite

Oxford dictionary: “refer to (a passage, book, or author) as evidence for or justification of an argument or statement, especially in a scholarly work”

Isaac Newton (1675): “If I have seen further, it is by standing on the shoulders of giants”

Citations are unanimously recognised as crucial for knitting together our scientific and cultural knowledge



References and citations

Related Works Intertextual semantics: a semantics for information design

Renear, Dubin, and Sperberg-McQueen (2002, pp. 121–122) proposed a formal semantic approach for structured documents. **a reference**

References a reference

Renear, A., Dubin, D., & Sperberg-McQueen, C.M. (2002). Towards a semantics for XML markup. In E. Munson (Chair), Proceedings of the ACM Symposium on Document Engineering, (pp. 119–126). New York: ACM Press.

a reference

Modeling markup semantics

Towards a semantics for XML markup

Markup semantics are modeled computationally by applying knowledge representation technologies to the problem of making those structures, relationships, and properties explicit.

a reference

citing article

Related Works

Intertextual semantics: a semantics for information design

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denotes
in-text
reference pointer

References bibliographic reference

Renear, A., Dubin, D., & Sperberg-McQueen, C.M. (2002). Towards a semantics for XML markup. In E. Munson (Chair), Proceedings of the ACM Symposium on Document Engineering, (pp. 119–126). New York: ACM Press.

cites

cited article

references

is relevant to

Modeling markup semantics

Towards a semantics for XML markup

Markup semantics are modeled computationally by applying knowledge representation technologies to the problem of making those structures, relationships, and properties explicit.

Everything is a reference

Semantic overload!

A citation is a **conceptual directional link** from a citing entity to a cited entity

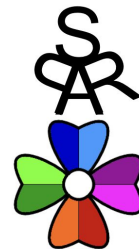
Unambiguous vocabularies

Development of a **set of complementary and orthogonal models** that can be used for the description of the main areas of this publishing domain, from the metadata of scholarly artefacts to the specification of the workflow processes that result in the publication of a scholarly product

SPAR (Semantic Publishing and Referencing) Ontologies

<http://www.sparontologies.net> – [@sparontologies](#)

- Available with a Creative Commons Attribution License 4.0
- Short descriptive page on the SPAR website, diagrams, examples of usage, publication information, HTML documentation



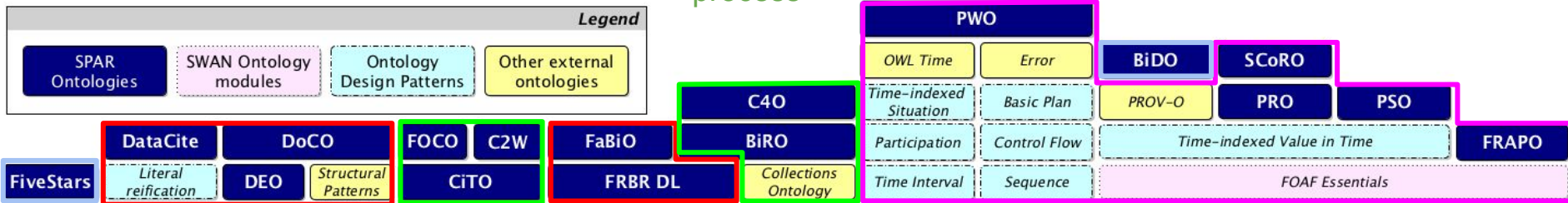
SPAR Ontologies: a diagram

17 OWL 2 DL ontologies

Reuse of several existing models and design patterns

Components involved in the citation process

Specification of qualitative and quantitative evaluations of a bibliographic resource or an agent (impact factor, h-index, e-index, etc.) and for the encoding of a Five Stars rating for articles



Bibliographic resources, their identifiers, and their internal components (paragraphs, sections, results, methods, etc.)

Contextual aspects of a publication, namely agents' roles, document statuses, steps in the publishing workflow, contributors' roles, and related academic administrative information

open citations

What is an open citation?

A **bibliographic citation** is a conceptual directional link from a citing entity to a cited entity, for the purpose of acknowledging or ascribing credit for the contribution made by the author(s) of the cited entity

The **citation data** related to a particular citation must include:

- the *representation* of such a conceptual directional link
- the *basic metadata* of the citing entity and the cited entity, i.e. sufficient information to create or retrieve textual bibliographic references for each of the entities

A bibliographic citation is an **open citation** when the data needed to define the citation are compliant with the following principles

Structured

Citation data must be expressed in one or more **machine-readable formats**

Unstructured REFERENCES

Björk BC, Laakso M, Welling P, Paetau P. 2014. Anatomy of green open access. *Journal of the Association for Information Science and Technology* **65(2):**237–250.

Structured (JSON)

```
"reference": [{  
  "issue": "2",  
  "key": "10.7717/peerj.4375/ref-11",  
  "doi-asserted-by": "crossref",  
  "first-page": "237",  
  "DOI": "10.1002/asi.22963",  
  "article-title": "Anatomy of green open access".
```

Structured (RDF)

```
coci:020070701073625141427193704030705-0200100000236102818370202090603
```

```
a cito:Citation ;  
rdfs:label "oci:020070701073625141427193704030705-0200100000236102818370202090603" ;  
cito:hasCitationCreationDate "2018-02-13"^^xsd:date ;  
cito:hasCitationTimeSpan "P4Y3M7D"^^xsd:duration ;  
cito:hasCitedEntity <http://dx.doi.org/10.1002/asi.22963> ;  
cito:hasCitingEntity <http://dx.doi.org/10.7717/peerj.4375> .
```

ology"

Separate

Citation data must be available without the need to access the source bibliographic entity (e.g. the article or book) in which the citation is defined

joined

PeerJ

View 433 tweets

Related research

✓ PEER-REVIEWED

The state of OA: a large-scale analysis of the prevalence and impact of Open Access articles

Research article | Legal Issues | Science Policy | Data Science

Heather Pwower¹, Jason Priem¹, Vincent Larivière^{2,3}, Juan Pablo Alperin^{4,5}, Lisa Matthias⁶, Bree Norlander^{7,8}, Ashley Farley^{7,8}, Jevin West⁷, Stefanie Haustein⁹

Published February 13, 2018

Note that a [Preprint of this article](#) also exists, first published August 2, 2017.

PubMed 29456894

- Author and article information
- Abstract
- Main article text

Introduction

- The movement to provide open access (OA) to all research literature is now over fifteen years old. In the last few years, several developments suggest

...

References

Anderson. 2017a. *When the wolf finally arrives: big deal cancellations in North American Libraries.* The Scholarly Kitchen. <https://scholarlykitchen.sspnet.org/2017/0...> (accessed 09 January 2018)

Anderson. 2017b. *The forbidden forecast: thinking about open access and library subscriptions.* The Scholarly Kitchen. <https://scholarlykitchen.sspnet.org/2017/0...> (accessed 15 July 2017)

Antelman K. 2017. *Leveraging the growth of open access in library collection decision making.* In: *Proceeding from ACRL 2017: at the helm: leading transformation.*

Archambault É, Amyot D, Deschamps P, Nicol A, Provencher F, Rebout L, Roberge G. 2013. Proportion of open access peer-reviewed papers at the European and world levels-2004-2011. European Commission, Brussels

Archambault É, Amyot D, Deschamps P, Nicol AF, Provencher F, Rebout L, Roberge G. 2014. Proportion of open access papers published in peer-reviewed journals at the European and world levels-1996-2013. European Commission

Archambault É, Côté G, Struck B, Voorons M. 2016. *Research impact of paywalled versus open access papers.*

<https://peerj.com/articles/4375/>

separate

```
l
{
  {
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  }
},
...
```

<https://w3id.org/oc/index/ocid/api/v1/references/10.7717/peerj.4375>

Open

Citation data must be freely accessible and reusable **without restrictions**, for example by publication under the [CC0 1.0 Universal waiver/license](#)

close

"databases pricing is a complex issue which depends on the size of the organization, discounts which they negotiated and other elements as well [...] the estimation of **WOS costs is about \$100,000 per year** for large organizations [...] the cost of Scopus database is about 85-95% of the cost of WOS for the same organizations [...] **Scopus pricing is set according to annual subscription fee** with unlimited usage"

Chadegani et al. (2017). A Comparison between Two Main Academic Literature Collections: Web of Science and Scopus Databases. *Asian Social Science*, 9 (5). DOI: <https://doi.org/10.5539/ass.v9n5p18>

open

"Crossref asserts **no claims of ownership** to individual items of bibliographic metadata and associated Digital Object Identifiers (DOIs) acquired through the use of the Crossref Free Services"

<https://github.com/CrossRef/rest-api-doc>

"The data held in the OpenCitations Corpus is made freely available under a **Creative Commons public domain dedication (CC0)**"

<http://opencitations.net/licenses>

"The content of Wikidata is available under a **free license**"

<https://www.wikidata.org>

Identifiable and Available

The citing and cited entities must be clearly **identified** by using a specific persistent identifier scheme (e.g. a DOI) or a URL, and...

... it must be possible, by resolving the identifiers of the citing and cited entities, to **obtain the basic metadata** of both the entities, sufficient to create or retrieve textual bibliographic references for each of them

(Such basic entity metadata **must also be** structured, separate and open)

Initiative for Open Citations (I4OC)

Towards open citations

2010: Open Citations Corpus released as [main outcome of Jisc project](#)

2013: David Shotton's talk [COASP 2013](#)

2016 (May): [First](#) WikiCite workshop

2016 (July): launch of [new instance](#) of the [OpenCitations](#) Corpus by [OpenCitations](#)

2016 (September): Dario Taraborelli's talk at [COASP 2016](#)

2016 (around November): first conf call of [I4OC](#) (without a formal name)

How many citations were open before April 2017

Before April 2017, the fraction of publications with open references was 1% out of millions of articles with references deposited with Crossref

(Crossref is a non-for-profit official DOI Registration Agency launched in early 2000 that enables persistent cross-publisher citation linking in online academic journals. Publishers may deposit reference lists to Crossref, together with other metadata deposited for each work with a DOI)



1%

Several publishers did not know they could release them as open data by means of the Crossref API – <https://api.crossref.org>

April 2017: the Initiative for Open Citations (I4OC)

Goal: to persuade the major academic publishers to open their deposited references all at once

Key benefits (as listed in the website, <https://i4oc.org>):

- the establishment of a **global public web of linked scholarly citation data** to enhance the discoverability of published content, both non-OA and OA
- the ability to build new services over the open citation data, for the **benefit of publishers, researchers, funding agencies, academic institutions and the general public**, as well as enhancing existing services
- the creation of a public citation graph to explore connections between knowledge fields, and to **follow the evolution of ideas and scholarly disciplines**

Founders and stakeholders

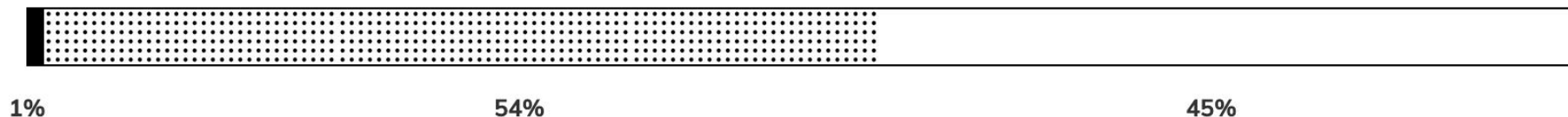
founders



758 publishers participating (as of February 2019)

How many citations are open now

As of February 2019, the fraction of publications with open references has grown from 1% to **55% out of 43.2 million articles** with references deposited with Crossref – and more than **500M citations** are now open



Several services have been developed using the citation data released so far

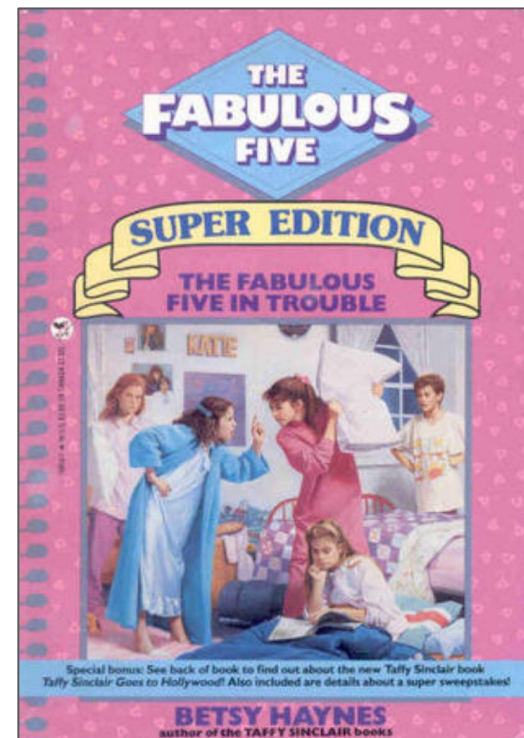
See the **Workshop on Open Citations** (<https://workshop-oc.github.io>) and **WikiCite 2018** (https://meta.wikimedia.org/wiki/WikiCite_2018) and the related hashtags ([#WOOC2018](#) and [#wikicite](#)) for the latest highlights from the community

Who is missing

Just five publishers among the top 20 DOI depositors are not distributing open references (as of May 2019):

- Elsevier
- Wolters Kluwer Health
- IEEE “dedicated to advancing technology for **the benefit of humanity**”
- IOP Publishing “to advance physics for **the benefit of all**”
- American Chemical Society “to advance the broader chemistry enterprise and its practitioners for **the benefit of Earth and its people**”

The last three are **scholarly societies...**



Uptake, part 1

ISSI:

<http://www.issi-society.org/open-citations-letter/>

Open citations: A letter from the scientometric community to publishers

December 5th, 2017

Openness is central to the research endeavor. It is essential for the reproducibility and appraisal of research, reduce miscommunication, equitable access to and participation in science. Yet, calls for openness in science are often met with initial resistance. Open access print servers, open access repositories, and open data have been initially resisted, but eventually adopted without adverse effects on the ecosystem. The launch of the **Initiative for Open Citations** has faced similar obstacles. This initiative has campaigned for scientists to make openly available the references found in articles from publishers, including most of the large ones, support them to open their references. However, the initiative still lacks the support of the large publishers.

David Shotton (2018). *Nature* 553 (129).
DOI: <https://doi.org/10.1038/d41586-018-00104-7>

Funders should mandate open citations



All publishers must make bibliographic references free to access, analyse and reuse, argues David Shotton.

David Shotton 



 [PDF version](#)

Over the past two decades, open access to journal articles, software and research data has changed from aspirational to commonplace. However, truly open scholarship also requires that bibliographic references be freely available for analysis and

French National Plan for Open Science:
<http://bit.ly/FranceOpenScience>

FIRST COMMITMENT: ACCESS TO PUBLICA

Open scientific publishing must become the standard approach as soon as possible. To drive this dynamic, research publications resulting from calls for projects that receive public funding must be disseminated through open access platforms, whether in journals or books or through an open public repository such as HAL.

To sustain these practices over time, the assessment system for researchers and research institutions must be updated to reflect the principles and practices of open science. Changes in the way researchers are assessed will seek to give greater weight to quality rather than quantity, as outlined in the **San Francisco Declaration on Research Assessment (DORA)** proposals and the **Leiden Manifesto** principles, and make better use of open citations, in keeping with the **Initiative for Open Citations (I4OC)**.

Uptake, part 2

DORA: <https://sfdora.org/read/>

DORA

SIGN DORA READ THE DECLARATION SIGNERS

Follow us on twitter

Improving how research is a

Join the organizations and individuals who have signed the Declar

Sign the declaration

Read the full declaration >

9. Whether a journal is open-access or subscription-based, limitations on reference lists in research articles and non-Creative Commons Public Domain Dedication [10].

Plan S: <https://www.coalition-s.org/implementation/>

Plan S

Making full and immediate Open Access a reality

Why Plan S 10 Principles Funders & support Implementation About Contact

Plan S

Making full and immediate Open Access a reality

9.3 Recommended additional criteria for journals and platforms:

- > Support for PIDs for authors (such as ORCID), funders, funding programmes and grants, institutions, and so on.
- > Direct deposition of publications by the publisher into Plan S compliant author designated or centralised Open Access repositories.
- > Openly accessible data on citations according to the standards by the Initiative for Open Citations I4OC.

Crossref participation report

“Participation reports give a clear picture for anyone to see the metadata Crossref has”

<https://www.crossref.org/participation/>

You can check whether your favourite publisher release open references – and, if it does not, please write it an email asking to release them!

References



Open references



<https://www.crossref.org/members/prep/>

How

If you are a publisher that already submits article metadata to Crossref as a participant in their [Cited-by](#) service, opening your reference data can be achieved in a matter of days, either:

1. by contacting Crossref by e-mail (support@crossref.org), asking them to turn on reference distribution for all of the relevant DOI prefixes, or
2. by setting the `<reference_distribution_opt>` metadata element to "any" for each DOI deposit

If not already a participant in Cited-by, a Crossref member can register for this service free-of-charge

A ongoing study on
Humanities and Social Sciences with
Crossref open citation data

ERIH-PLUS journal and disciplines

The [European Reference Index for the Humanities and the Social Sciences \(ERIH PLUS\)](#) makes available a list of journals in the Humanities and Social Sciences domain

ERIH PLUS includes 30 disciplines: we have asked experts to categorise them as Arts & Humanities (AH) or Social Science (SS) – some of them have been categorise both AH and SS, e.g. “Media Studies and Communication”

	Total	At least one AH discipline	At least 50% AH disciplines	Only AH disciplines	At least one SS discipline	Only SS discipline
Number of journals	7,226	4,920	4,386	2,511	4,714	2,306

ERIH PLUS: Crossref vs. WoS and Scopus

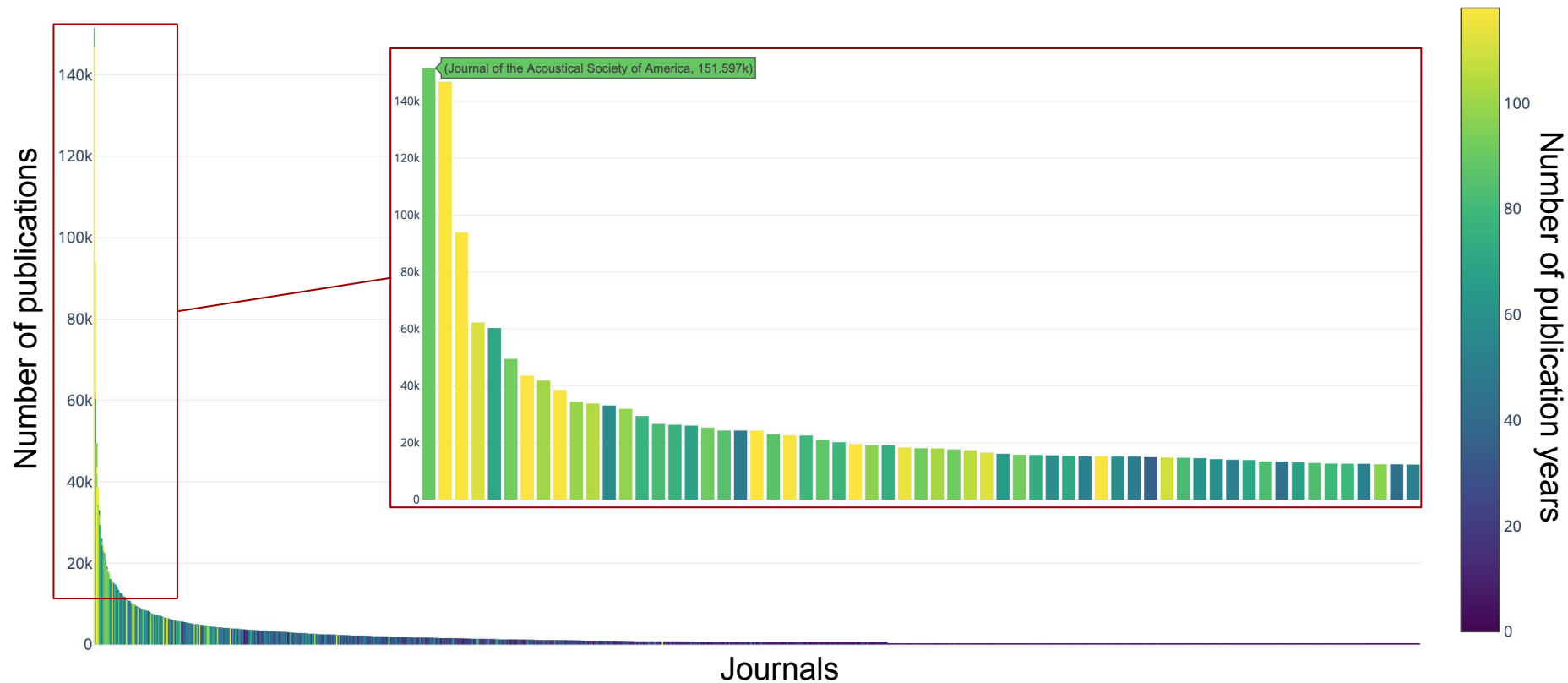
We looked at how many journals in ERIH PLUS are actually mentioned in three databases, i.e.

Crossref (open), Web of Science Core (WoS Core, closed) and Scopus (closed)

Crossref has wider coverage

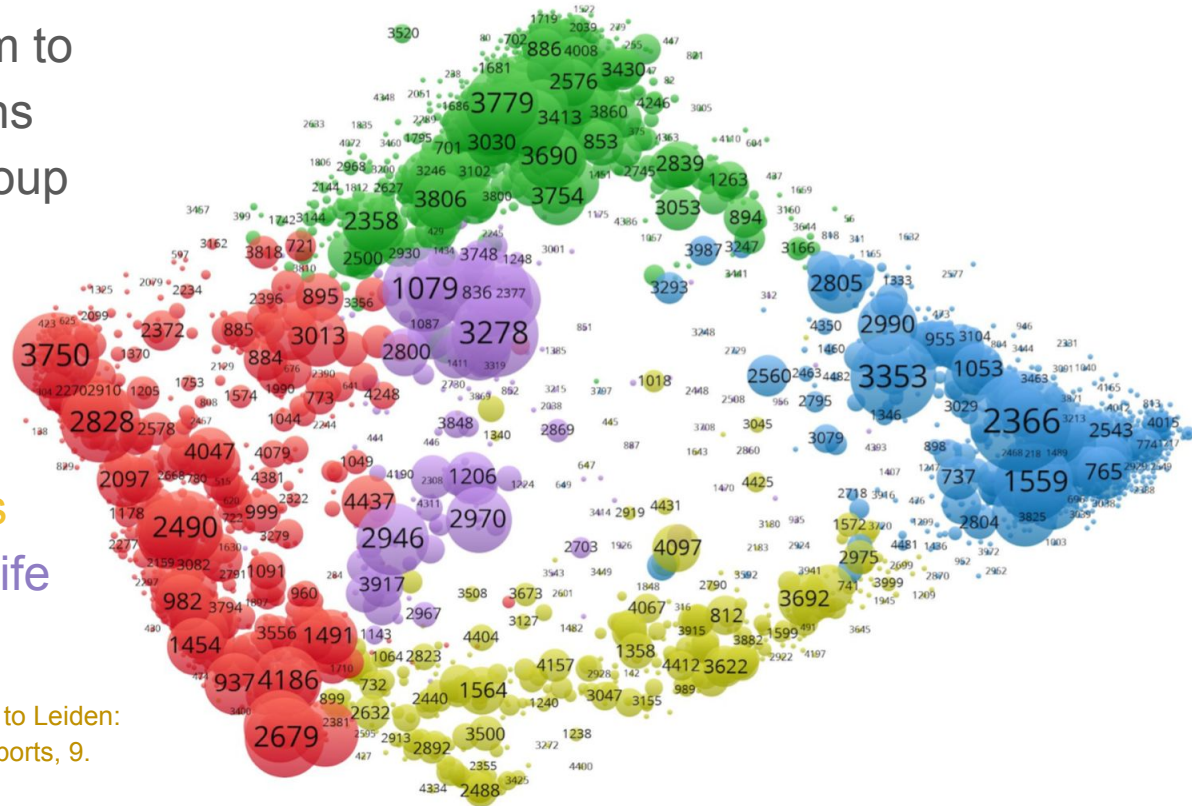
Source and dump date	Total number of journals	Number of journals included in ERIH-PLUS	Number of journals included in ERIH-PLUS with \geq 50% disciplines in AH
Crossref (August 2018)	95,367	4,977	2,841
Scopus (May 2018)	37,452	3,328	2,026
WoS Core (13th week 2018)	19,226	2,133	1,238

Publications in ERIH PLUS journals found in Crossref



Identify macro-areas in Crossref

We used the Leiden algorithm to identify clusters of publications (via open citations) and to group them in 5 areas: **Physical sciences and engineering**, **Biomedical and health sciences**, **Social sciences and humanities**, **Mathematics and computer science**, and **Life and earth sciences**



Traag VA, Waltman L, van Eck NJ (2019). From Louvain to Leiden: guaranteeing well-connected communities. *Scientific Reports*, 9. DOI: <https://doi.org/10.1038/s41598-019-41695-z>

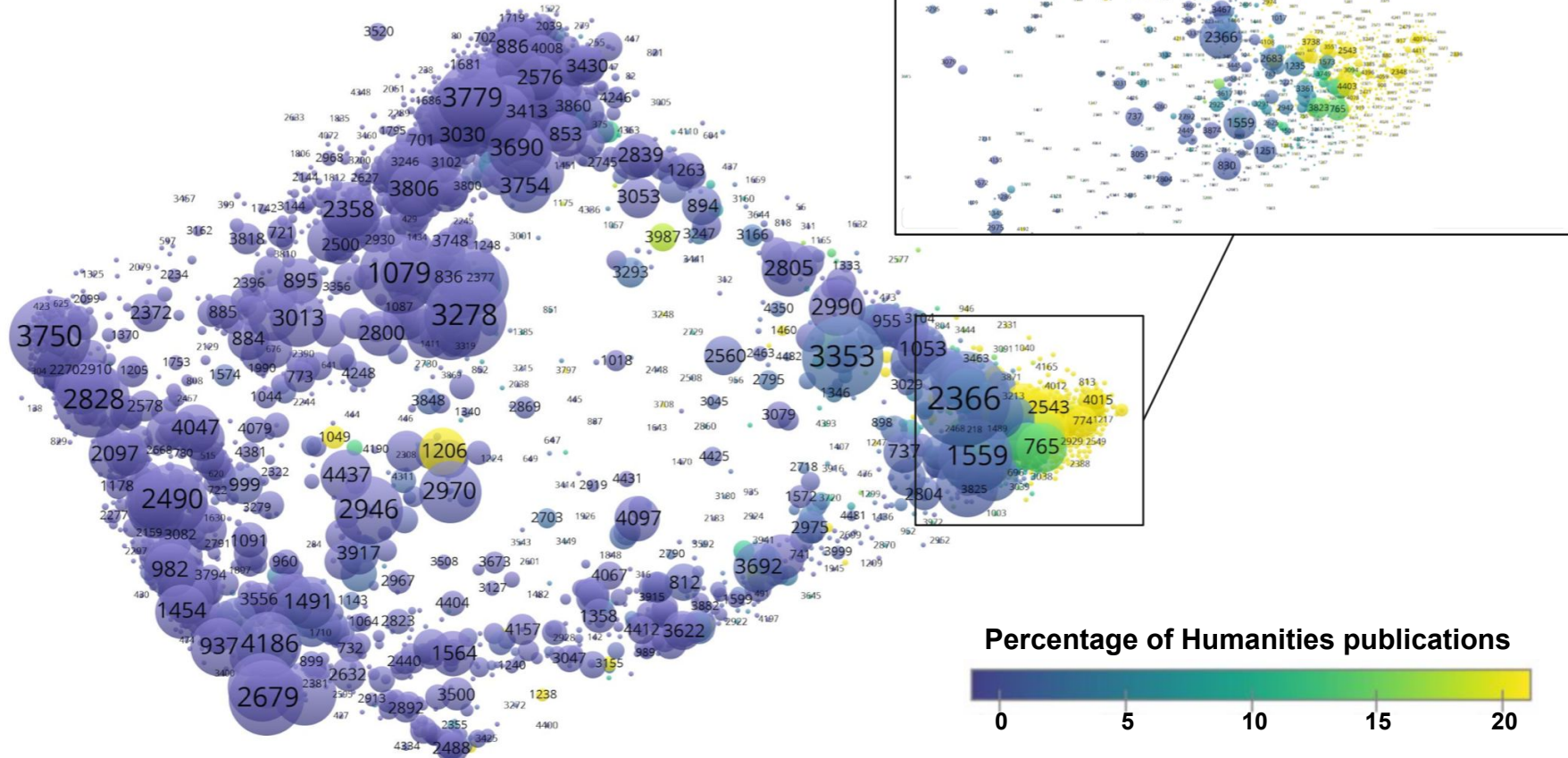
Question: what are the Humanities?

Propose a strategy to define Arts and Humanities in Crossref

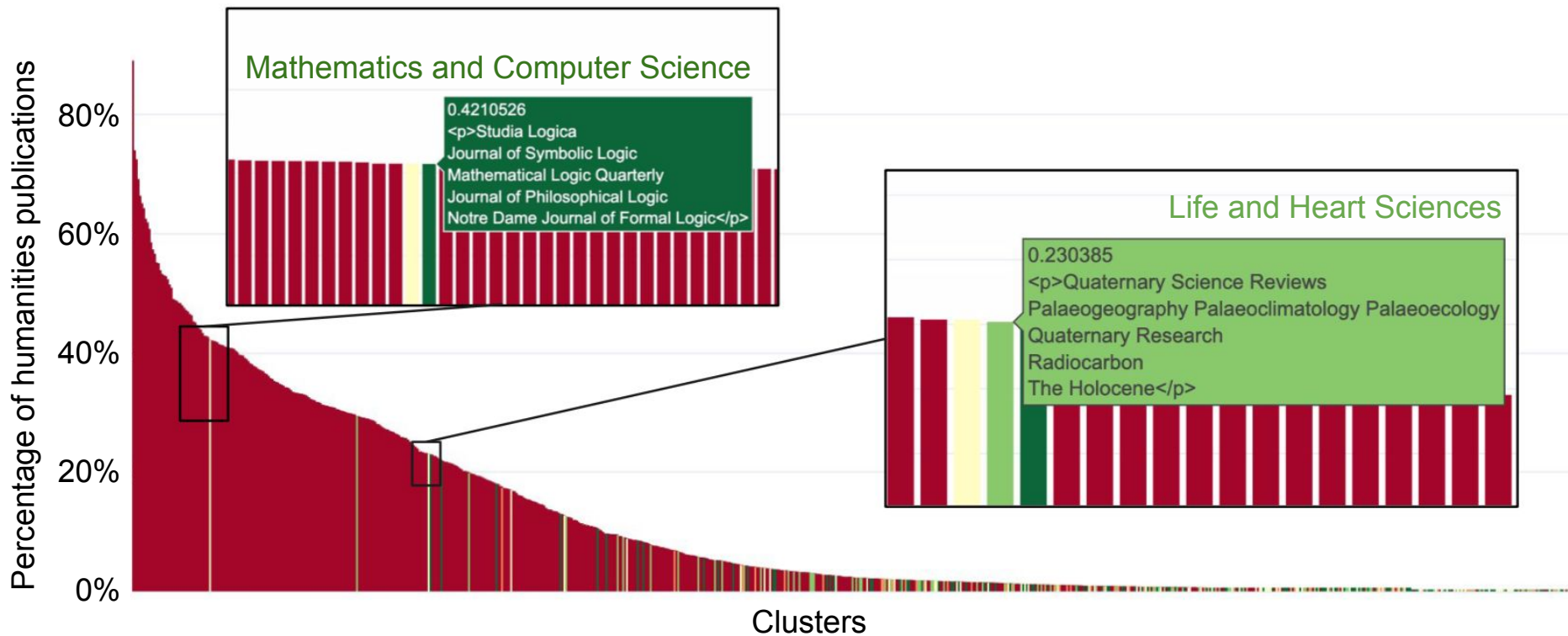
Methodology:

1. Create the clusters of publications by means of the Leiden algorithm using the citation network extracted from Crossref open citation data
2. For each cluster, record the percentage of publications that were published in any of the AH journals as defined in ERIH PLUS
3. All the publications in the cluster that have at least an X% (to define) of publications in ERIH PLUS AH journals are recorded as AH publications
4. Visualise the data to show the shape of the AH domain via [VOS viewer](#)

Humanities: what are they



Humanities clusters



Preliminary results

The majority of clusters with the highest percentage of publications in ERIH PLUS journals are contained in the main field Social Sciences and Humanities

The labels of the clusters are coherent with its Arts and Humanities content – this is true even for clusters **outside** Social Sciences and Humanities main field

Beyond Crossref: [OpenCitations](#)

Back to 2010

OpenCitations formally started in 2010 as a one-year project funded by JISC (with a subsequent extension), with David Shotton as director, who at that time was working in the Department of Zoology at the University of Oxford

Goal: to publish open bibliographic citation information in RDF and to make citation links as easy to traverse as Web links

Main outcomes – full details [in the official blog](#):

- open repository of scholarly citation data named the **OpenCitations** Corpus
- [SPAR \(Semantic Publishing and Referencing\) Ontologies](#), for describing such citation data in RDF

OpenCitations today

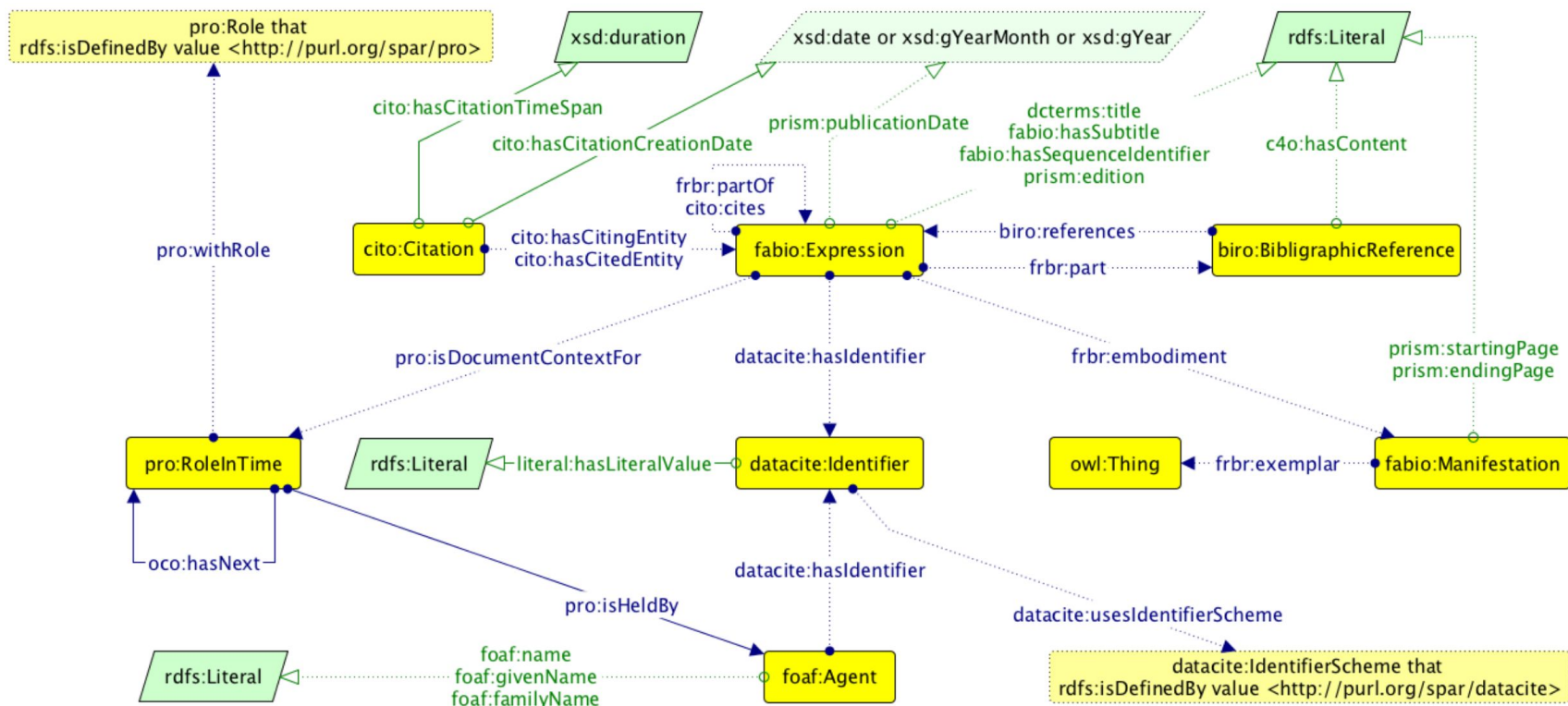
OpenCitations (<http://opencitations.net>) is a scholarly infrastructure organization

- dedicated to **open scholarship** and the **publication of open bibliographic and citation data** by the use of Semantic Web technologies
- engaged in advocacy for **open citations**

It provides:

- data models: the [OpenCitations Data Model](#) (based on SPAR Ontologies)
- bibliographic and citation data (CC0): [OpenCitations Corpus](#), [COCI](#), [CROCI](#)
- software: [GitHub repository](#) released with open source licenses
- online services: [dumps](#), [REST APIs](#), [SPARQL endpoints](#), and [authoring](#) / [querying](#) / [browsing](#) interfaces

OpenCitations Data Model



Citations as first-class data entities

Citations are normally treated simply as the links between published entities

Journal of Documentation

Setting our bibliographic references free: towards open citation data

Author(s): Silvio Peroni (Department of Computer Science and Engineering, University of Bologna, Bologna, Italy), Alexander Dutton (IT Services, University of Oxford, Oxford, UK), Tanya Gray (Bodleian Libraries, University of Oxford, Oxford, UK), David Shotton (Oxford e-Research Centre, University of Oxford, Oxford, UK)

Abstract: Purpose
– Citation data needs to be recognized as a part of the Commons – those works that are freely and legally available for sharing – and placed in an open repository. The paper aims to discuss this issue.

Citing article

cites

PLOS COMPUTATIONAL BIOLOGY

Adventures in Semantic Publishing: Exemplar Semantic Enhancements of a Research Article

David Shotton, Katie Portwin, Graham Wong, Alastair Miles

Published: April 17, 2009 • <https://doi.org/10.1371/journal.pcbi.1000301>

Cited article

Abstract
Introduction
The Target for Our Semantic Enhancements
Functional Enhancements to the PLoS NTDS Article
Scientific innovation depends on finding, integrating, and re-using the products of previous research. Here we explore how recent developments in Web technology, particularly those related to the publication of data and metadata, might assist that process by providing semantic enhancements to journal articles within the mainstream process of scholarly journal publishing. We exemplify this by describing semantic enhancements we have made to a recent biomedical research article.

Alternative richer view is to regard a citation as a data entity in its own right

has citing article

Journal of Documentation

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The Citation

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has cited article

What we are pushing, particularly in the Indexes

Open Citation Identifier (OCI)

New persistent identifier scheme for citations contained in bibliographic databases

Simple structure: `oci:number-number`, where “oci:” is the identifier prefix

Examples:

- `oci:01027931310-01022252312` (citation in Wikidata, identified by “010”)
- `oci:02001010806360107050663080702026306630509-02001010806360107050663080702026305630301` (citation in Crossref, identified by “020”)
- `oci:0302544384-0307295288` (citation in the OCC, identified by the “030”)

OCI resolver: <https://w3id.org/oc/oci>

About the datasets

OpenCitations Corpus (OCC, <https://w3id.org/oc/corpus>): new instance was set up at the University of Bologna in early July 2016, and currently contains **~14M citation links** to over **7.5M cited resources**

OpenCitations Indexes (<https://w3id.org/oc/index>):

COCI (launch: July 2018): **~445M citations** between **~46M bibliographic entities**

CROCI (launch: March 2019): **76 citations** between **81 bibliographic entities**

Service	OCC	Indexes
REST API	https://w3id.org/oc/api/v1	https://w3id.org/oc/index/api/v1
SPARQL endpoint	https://w3id.org/oc/sparql	https://w3id.org/oc/index/sparql
Textual search	https://w3id.org/oc/search	https://w3id.org/oc/index/search

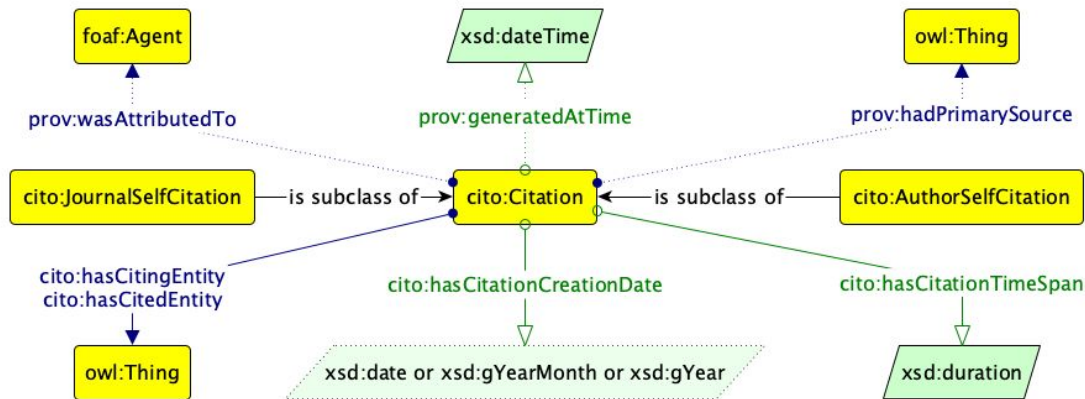
COCI

COCI, the OpenCitations Index of Crossref open DOI-to-DOI citations

(<https://w3id.org/oc/index/coci>),

is the first of the indexes proposed by OpenCitations (<https://w3id.org/oc/index>), in which citations are exposed as first-class data entities with accompanying properties

Heibi I, Peroni S, Shotton D (2019). COCI, the OpenCitations Index of Crossref open DOI-to-DOI citations. [arXiv:1904.06052](https://arxiv.org/abs/1904.06052)



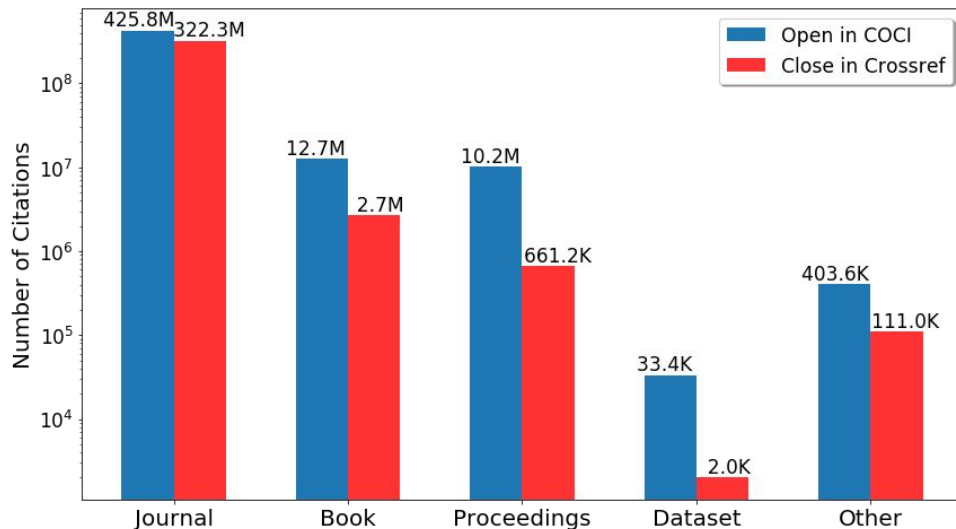
Publisher	Outgoing citations	Incoming citations
Springer Nature	79,860,827	52,257,862
Wiley	76,819,685	48,174,542
Elsevier	2,853,739	96,310,027
Informa UK Limited	41,433,917	14,975,989
Institute of Electrical and Electronics Engineers (IEEE)	30,114,985	20,940,703
American Physical Society (APS)	15,729,297	16,065,862
SAGE Publications	15,933,805	7,915,082
Ovid Technologies (Wolters Kluwer Health)	9,971,274	12,840,293
Oxford University Press (OUP)	9,891,000	11,466,659
AIP Publishing	10,130,022	8,455,097

Why CROCI?

Analysis of COCI + Crossref shows that number of closed citations is of great significance

One third of these are references to entities published by Elsevier, that refuses to open its references (see I4OC – <https://i4oc.org>)

Heibi I, Peroni S, Shotton D (2019). Crowdsourcing open citations with CROCI - An analysis of the current status of open citations, and a proposal. [arXiv:1902.02534](https://arxiv.org/abs/1902.02534)



Publisher of entities receiving citations	Open citations in COCI	Close citations in Crossref
Elsevier BV	97,079,715 (47.92%)	105,486,201 (52.08%)
Springer Nature	52,655,655 (61.05%)	33,596,285 (38.95%)
Wiley	48,228,581 (56.61%)	36,970,208 (43.39%)
Institute of Electrical and Electronics Engineers (IEEE)	21,084,872 (86.21%)	3,373,087 (13.79%)
American Physical Society (APS)	16,211,918 (72.52%)	6,142,167 (27.48%)
American Chemical Society (ACS)	15,706,062 (42.28%)	21,438,766 (57.72%)
Informa UK Limited	15,066,947 (68.39%)	6,965,166 (31.61%)
Ovid Technologies (Wolters Kluwer Health)	12,903,492 (56.38%)	9,981,473 (43.62%)
Oxford University Press (OUP)	11,530,527 (62.95%)	6,785,205 (37.05%)
AIP Publishing	8,736,352 (64.05%)	4,904,576 (35.95%)
SAGE Publications	7,978,522 (73.31%)	2,905,035 (26.69%)
JSTOR	6,426,926 (61.50%)	4,023,765 (38.50%)
University of Chicago Press	5,600,609 (74.20%)	1,947,231 (25.80%)
IOP Publishing	5,412,557 (68.82%)	2,452,803 (31.18%)
American Association for the Advancement of Science (AAAS)	5,204,267 (54.34%)	4,372,753 (45.66%)
Proceedings of the National Academy of Sciences	5,046,601 (56.57%)	3,874,616 (43.43%)
Royal Society of Chemistry (RSC)	4,960,056 (49.32%)	5,096,291 (50.68%)
Cambridge University Press (CUP)	4,883,890 (68.85%)	2,209,466 (31.15%)
American Psychological Association (APA)	4,530,463 (66.67%)	2,264,755 (33.33%)

Publisher submitting references to Crossref	Closed
Elsevier BV	11,020,314
Institute of Electrical and Electronics Engineers (IEEE)	3,331,913
American Chemical Society (ACS)	496,855
University of Chicago Press	41,566

CROCI uptake (limited so far)

Goal: individuals identified by ORCID identifiers may deposit citation information that they have a legal right to submit, and within which these submitted citation data will be published under a CC0 public domain waiver to emphasize and ensure their openness for every kind of reuse without limitation



Scholarcy: Read less. Learn more. @scholarcy · Feb 25

Initial implementation of #CROCI for @opencitations @i4oc_org is now live at ref.scholarcy.com. Select the download endpoint and reference_format=croci. Somewhat slow and currently limited to docs below 2MB at a few requests per day. Will improve matching process over time.



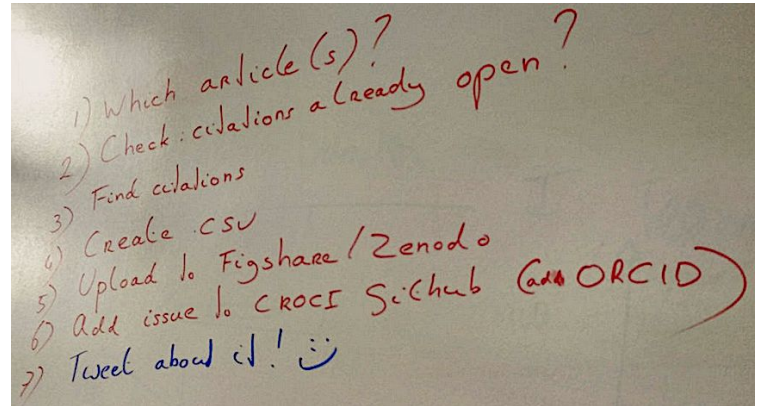
OpenCitations @opencitations · Mar 4

#CROCI (opencitations.net/index/croci) launched with citations by @aarontay @libsun @essepuntato. Its data are queryable using #REST #API (w3id.org/oc/index/croci...) or the unifying API for all indexes (w3id.org/oc/index/api/v1). To contribute: [github.com/opencitations/...](https://github.com/opencitations/) #opencscience #I4OC



Bi@nca Kramer @MsPHELPS · Mar 15

Just submitted a proposal for a practical session for Monday's Barcamp Open Science 2019 @lfovopencscience #oscibar - to contribute citation data to @opencitations Crowdsourced Open Citation Index (#CROCI) etherpad.wikimedia.org/p/oscibar2019_... (see also opencitations.wordpress.com/2019/02/07/cro...)



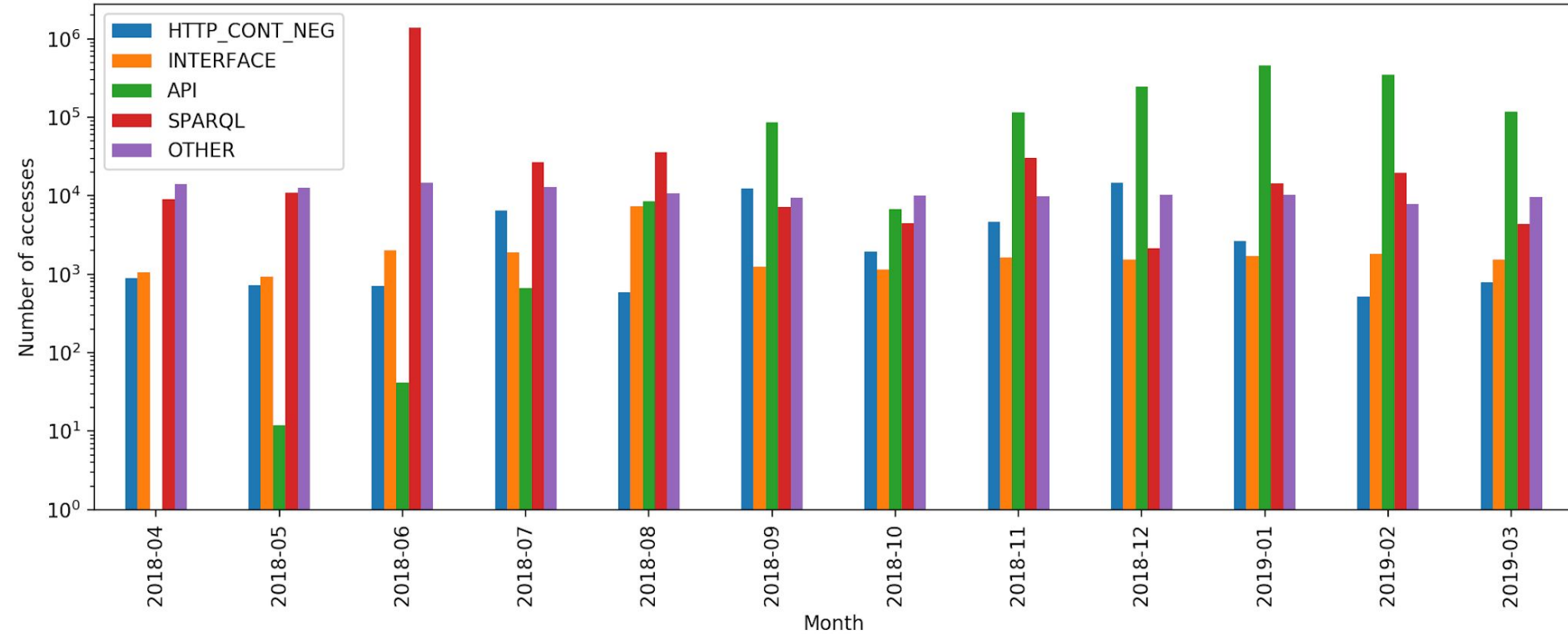
<https://twitter.com/konradfoerstner/status/1107657296396673024>

Collaborations and adoptions

- **Wikidata**: several bibliographic entries have been aligned with OCC resources
- **OpenAIRE**: is importing OCC metadata about articles into their database
- Daniel Ecer and Lisa Knoll of eLife are performing **analytics** on the OCC data
- Ontotext demonstrated **SPARQL query federation** between Springer Nature LOD and OCC
- Anna Kamińska published a bibliometrics **case study of PLOS ONE** articles in OCC
- Daniel Himmelstein is processing OpenCitations data to create **DOI-to-DOI citation tables**
- Thiago Nunes and Daniel Schwabe are using OCC to exemplify their **XPlain framework**
- Antonina Dattolo and Marco Corbatta are using the OCC as source for **VisualBib framework**
- **LOC-DB**, **EXCITE**, the **Venice Scholar Index**, and **CitExCyr** adopt the OpenCitations Data Model
- Nees Jan van Eck and Ludo Waltman extended **VOSviewer** so as to use data in the OCC + COCI
- The **data of the EXCITE Project** has been just added to the OCC (+ ~1M citations)
- **Citation Gecko** uses the OCC + COCI for retrieving citation data about the papers
- Philipp Zumstein developed a **Zotero plugin** that gives information about open citations using COCI
- **Oci Graphe** developed by Dominique Rouger is a Web tool to search articles in COCI

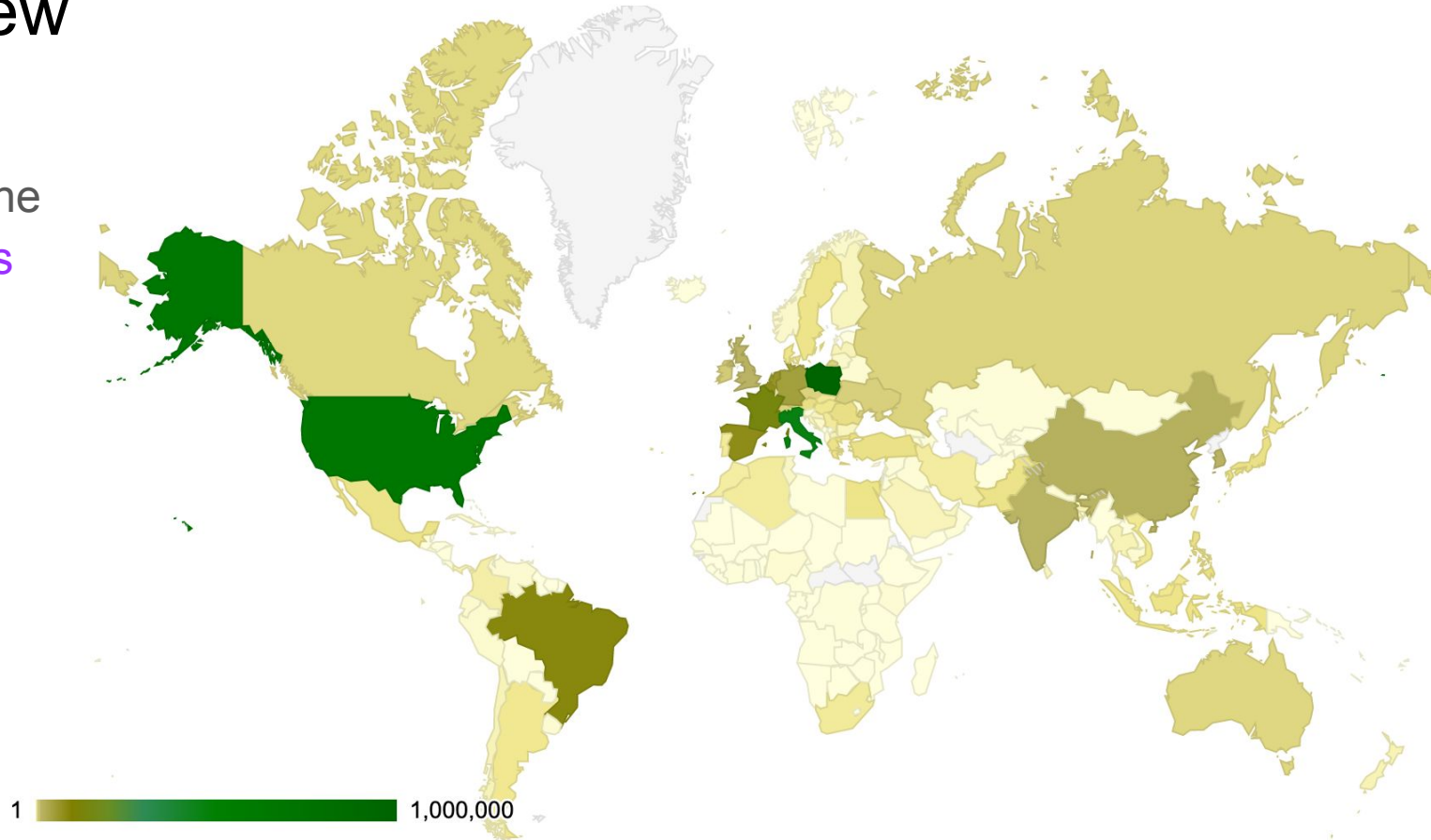
The rise of the REST APIs (April 2018 - March 2019)

Total number of accesses between April 2018 and March 2019



World view

Number of accesses to the [OpenCitations](#) services and website per country



A special thank to



Alfred P. Sloan
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UNIVERSITÀ DI BOLOGNA



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Conclusions

Extending the data

While there are available several open citation data in Crossref and “sister” initiatives and projects – e.g. [OpenCitations](#) (overall, 450M citations) and Wikidata (more than 170M citations) – there are several citation data that are not covered yet

Users (e.g. researchers, libraries, institutions) can contribute directly to fill this gap in different ways – e.g. see CROCI and Wikidata and their crowdsourced approaches for gathering additional open citation data

Towards broad adoption

Open citation data can be reused, due to the freedom provided by the license / waiver associated to them

Making available REST APIs is crucial to maximise the reuse of citation data, since they are the primary mechanism for allowing others to create applications upon citations

In addition to the project mentioned previously, we are talking to the University of Liège Institutional Repository (ORBi, <https://orbi.uliege.be>) and to DBLP (<https://dblp.uni-trier.de/>), which aim at integrating open citation data available in [OpenCitations](#) and Crossref in their Web services

The way to help

It is crucial to keep such very permissive license / waiver to metadata and citation data so as to maximise their reuse

Institutional repositories should **ask explicitly** to their authors the permission to release metadata and citation data of deposited papers as CC0 material independently from the license that is associated to the papers itself, which may be different

Thank you for your attention

Open Citations 101 Historical Background and Current Developments

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京都大学図書館機構

The Kyoto University Library Network



Current Developments of Open Citations
and Institutional Repository
20 May 2019 – Kyoto University Library
Kyoto, Japan



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