

# Ensure sustainable growth with a clear understanding of your research strengths

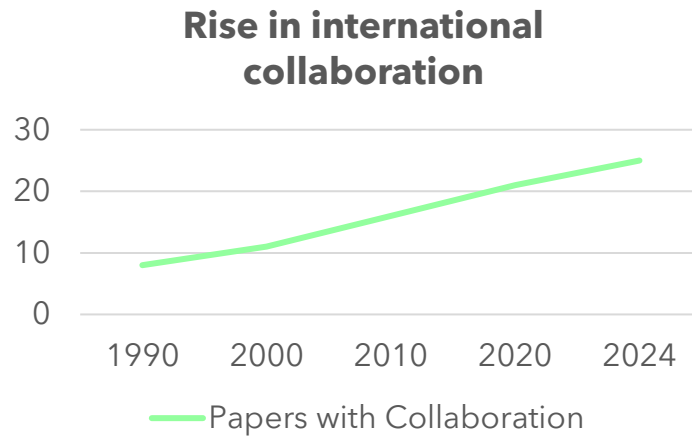
Assess your collaborations with a new suite of indicators



# Collaboration is pervasive

How can we see past the influence of collaboration?

- Research is increasingly international, with international collaborations rising from 8% in the 1990s to over 25% today.
- Collaboration influences citation patterns. Domestic work tends to receive fewer citations than research with international co-authors.



Performance assessments that ignore these factors may overlook issues, whether impact comes from research quality or collaboration patterns

International collaboration papers receive

70%

higher citations on average

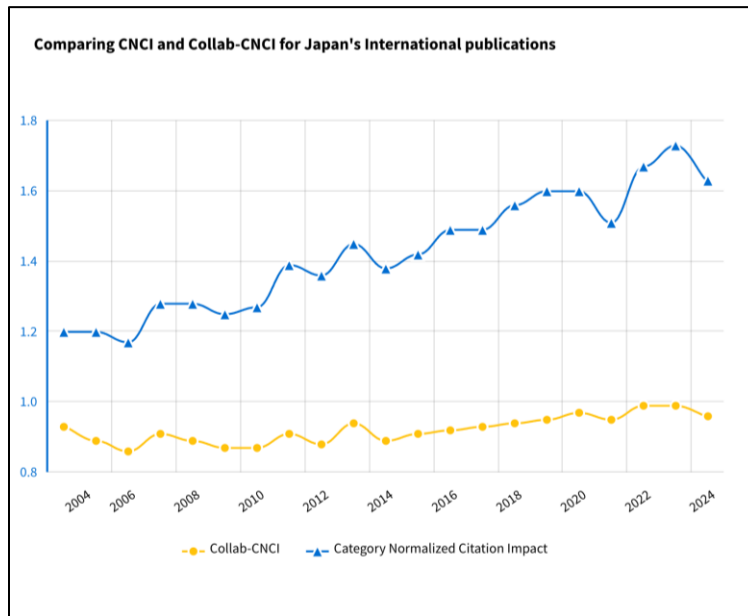


# Collab-CNCI

## Deeper insights into collaboration

### Developed by the Institute for Scientific Information (ISI)<sup>TM</sup>

- **CNCI (Category Normalized Citation Impact):** compares citation impact to global expected citations, normalized by subject, year and document type
- **Collab-CNCI:** compares citation impact, normalized by subject, year, document type and collaboration type
- Relying only on CNCI can provide a skewed view of research impact



- **Use CNCI** for broad comparisons across fields and countries
- **Use Collab-CNCI** for a more detailed and nuanced view of collaboration types

# Deeper insights into collaboration

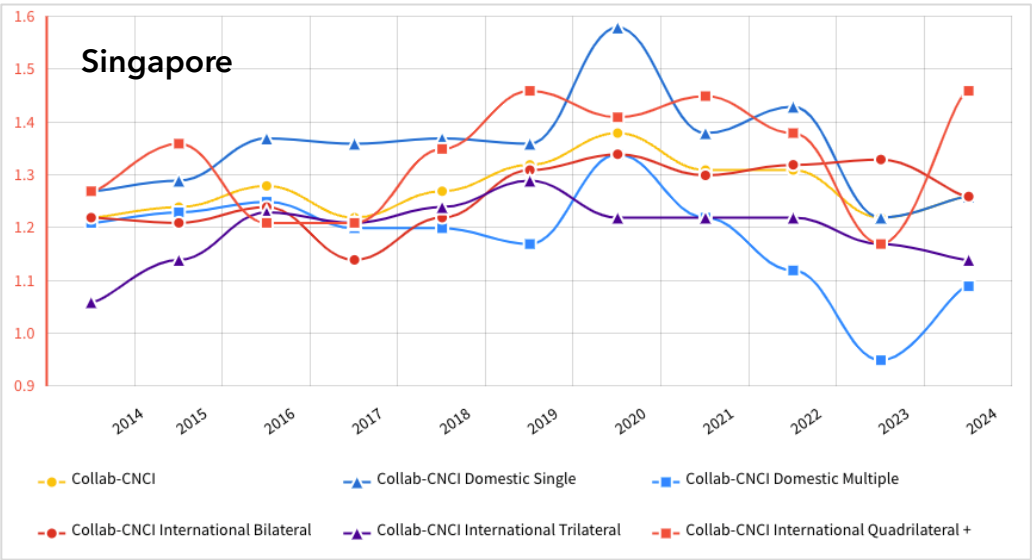
Understand your true strengths and weaknesses by normalizing for collaborations



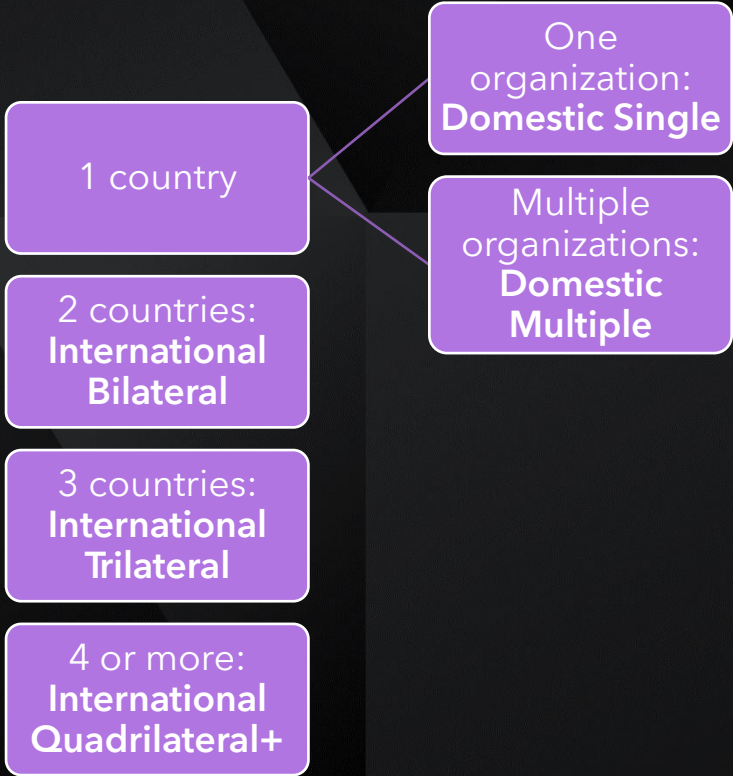
Collab-CNCI adds a fourth level of normalization, collaboration type, to the Category Normalized Citation Impact indicator.



Gain deeper, rationalized insights by deconstructing results into five collaboration types across domestic (single or multi- institution) and international (number of countries) teams.



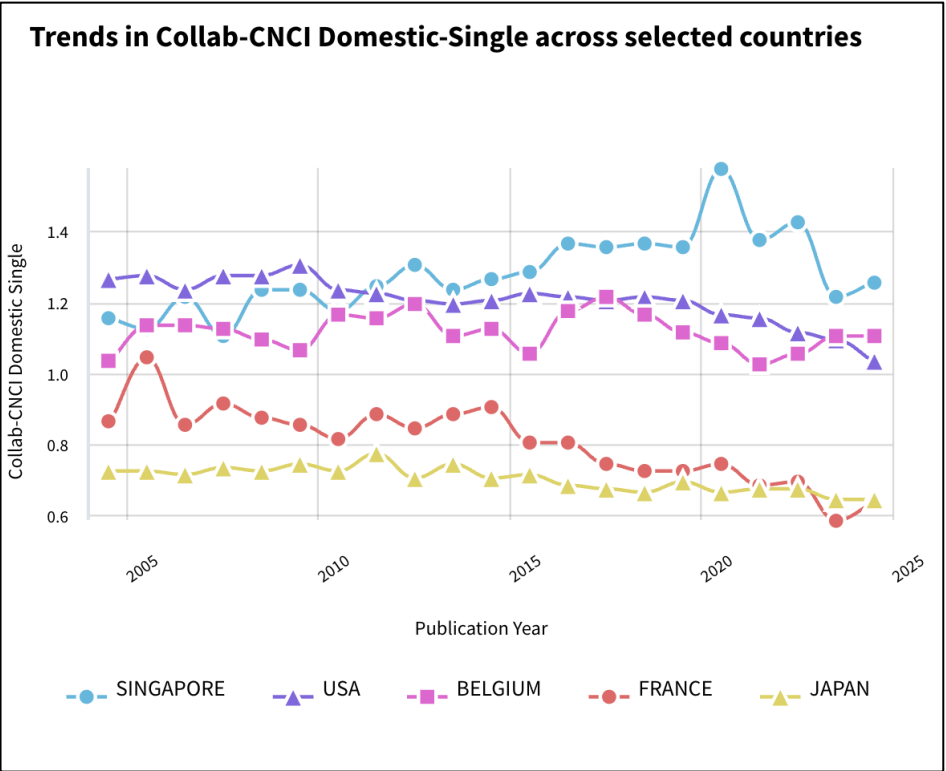
## 5 collaboration types:



# Build a strategy that fosters domestic sustainability

## Country comparisons

Benchmark research impact across countries by factoring in collaboration patterns for a fairer comparison



## Institutional comparisons

Institutions can appear undervalued with only CNCI if dominated by domestic collaborations

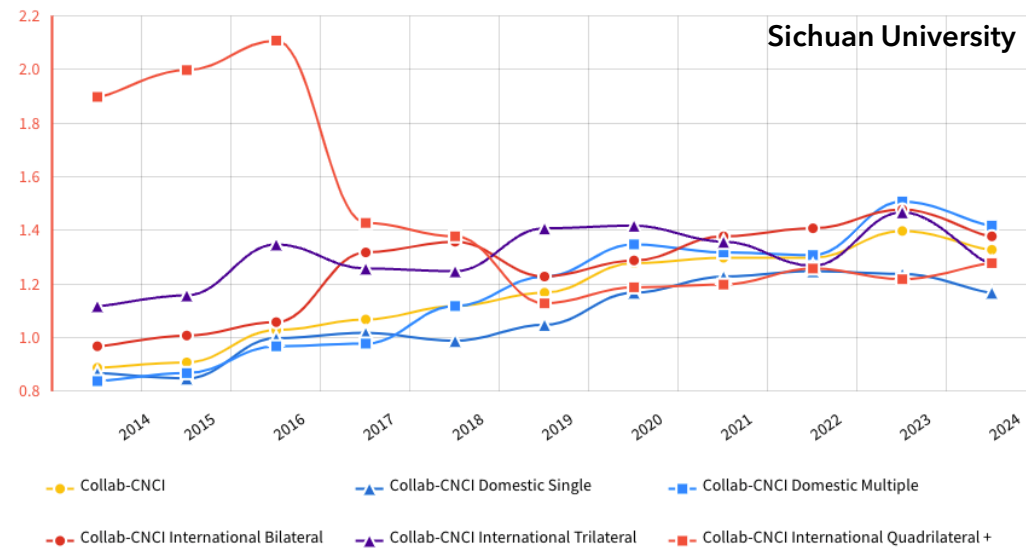
Organization Name	Category Normalized Citation Impact	Collab-CNCI	% Domestic Documents	% International Documents
University of California San Diego	1.98	1.61	57.74%	42.26%
Sichuan University	1.31	1.32	80.04%	19.96%
Utrecht University	1.81	1.25	38.62%	61.38%
University of Barcelona	1.77	1.07	43.33%	56.67%

Example: Sichuan University's performance might appear undervalued when looking at CNCI because the percentage of international collaborations is much higher for other institutions.

# Build a strategy that drives international impact

## Evaluate collaboration strategies over time

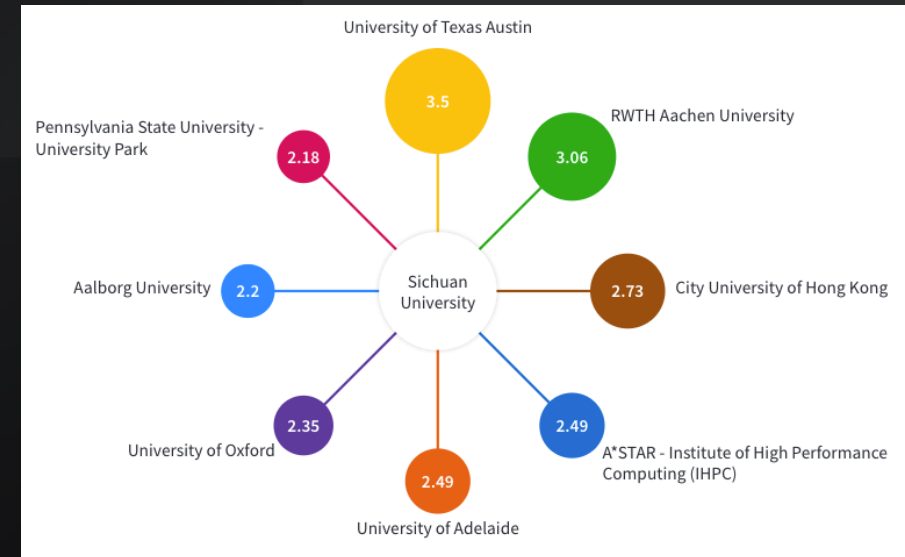
Comparing Collab-CNCI by collaboration type reveals how evolving collaboration strategies influence impact over years



Example: Sichuan University's research impact has steadily improved, with all collaboration types exceeding the global average since 2019, reflecting effective strategies

## Identify the strongest collaboration partners

Benchmarking bilateral collaborations across different countries can elevate the highest performing.



Apply additional metrics like Top 10% Documents for a detailed assessment of both research productivity and impact.

# Big picture Impact Profiles

Beyond average metrics

## At-a-glance impact benchmarking

- To gain a complete picture, look beyond average CNCI or Collab-CNCI values
- The Impact Profile shows the overall distribution, highlighting for instance, the low number of uncited documents at Sichuan University, which reflects its strong performance



# Actionable collaboration results

Ensure sustainable growth with a clear understanding of your research strengths



## Evaluate impact

Gain a balanced view of collaboration influence versus research quality, revealing true impact drivers.



## Balance collaboration partners

Maintain strong domestic and international networks to ensure sustained, resilient research impact over time.



## Align policies and funding

Apply Collab-CNCI to evaluate policy impact, targeting funds where collaborations yield highest impact





# Appendix – Legacy Indicators

# Old vs New Collaboration Indicators

Legacy Concept	Definition	Comparison to New Types
<b>International Collaborations</b>	At least 2 authors and at least 2 distinct countries.	Corresponds to the combination of International - Bilateral, -Trilateral, and -Quadrilateral+, but <b>requires <math>\geq 2</math> authors</b> . The new approach also classifies single-author multi-country papers as international. Instead use the indicators <b>International Documents</b> and <b>% International Documents</b> . Optionally combine with the <b>Authors per Document</b> filter
<b>Domestic Collaborations</b>	At least 2 authors, all from the same country, with at least 2 distinct <b>published</b> organization names.	Similar to <b>Domestic-Multiple</b> , but <b>requires <math>\geq 2</math> authors</b> and uses published organization names from the address and does <b>not</b> account for multiple resolved organizations in a single address. Hence it may undercount multiple institutions.
<b>Organization Only Collaborations</b>	At least 2 authors all from the <b>same resolved organization</b> (unresolved addresses are disregarded; parent-child not collapsed).	Conceptually close to <b>Domestic-Single</b> but excludes addresses not unified and does not collapse parent-child relationships properly. For accurate single-institution metrics, use the new <b>Domestic Single Documents</b> and optionally combine with " $\geq 2$ authors" filter.



# Appendix – Collaboration Types

# Collaboration Type - Methodology

## International Collaboration – 1/2

- **All addresses are considered**, including addresses for organizations which are not unified

The country indicated in the address is used, not the country of the unified organization which in theory can be different

- If number countries  $\geq 2$ : categorize the document as
  - International – Bilateral: 2 countries
  - International – Trilateral: 3 countries
  - International Quadrilateral+: 4 or more countries
- For example: WOS:000551549800007 is classified as **International – Trilateral**

Corresponding Address: Siahrostami, Samira (corresponding author)

▼ Univ Calgary, Dept Chem, Calgary, AB T2N 1N4, **Canada**

E-mail Addresses :

[samira.siahrostami@ucalgary.ca](mailto:samira.siahrostami@ucalgary.ca)

Addresses :

▼ <sup>1</sup> Univ Calgary, Dept Chem, Calgary, AB T2N 1N4, **Canada**

▼ <sup>2</sup> Sogang Univ, Dept Chem & Biomol Engn, Seoul 04107, **South Korea**

▼ <sup>3</sup> Carnegie Mellon Univ, Dept Mech Engn, Pittsburgh, PA 15213, **USA**

▼ <sup>4</sup> Rice Univ, Dept Chem & Biomol Engn, Houston, TX, **USA**

▼ <sup>5</sup> Lawrence Berkeley Natl Lab, Berkeley, CA 94720, **USA**

▼ <sup>6</sup> Toyota Res Inst, Los Altos, CA 94022, **USA**

Affiliation

Toyota Motor Corporation

Unified organization country is Japan, not used to count number countries

ROR ID: <https://ror.org/02zqm6r10> ▼




# Collaboration Type - Methodology

## International Collaboration – 2/2

- **The number of authors is not considered**
- For example: WOS:000611933300001 only has 1 author but is classified as **International - Trilateral**

### Economic complexity theory and applications

 Highly Cited Paper

By  
[Are you this author?](#)

Hidalgo, CA (Hidalgo, Cesar A.) [1], [2], [3]

[View Web of Science ResearcherID and ORCID](#) (provided by Clarivate)

Source

NATURE REVIEWS PHYSICS ▾

Corresponding Address: Hidalgo, Cesar A. (corresponding author)

▾ Univ Toulouse, Artificial & Nat Intelligence Toulouse Inst ANITI, Ctr Collect Learning, Toulouse **France**

Corresponding Address: Hidalgo, Cesar A. (corresponding author)

▾ Univ Manchester, Alliance Manchester Business Sch, Manchester, Lancs **England**

Corresponding Address: Hidalgo, Cesar A. (corresponding author)

▾ Harvard Univ, Sch Engn & Appl Sci, Cambridge, MA 02138 **USA**

E-mail Addresses :

[cesifoti@gmail.com](mailto:cesifoti@gmail.com)

Addresses :

▾ <sup>1</sup> Univ Toulouse, Artificial & Nat Intelligence Toulouse Inst ANITI, Ctr Collect Learning, Toulouse **France**

▾ <sup>2</sup> Univ Manchester, Alliance Manchester Business Sch, Manchester, Lancs **England**

▾ <sup>3</sup> Harvard Univ, Sch Engn & Appl Sci, Cambridge, MA 02138 **USA**

E-mail Addresses :

[cesifoti@gmail.com](mailto:cesifoti@gmail.com)

# Collaboration Type - Methodology

## Domestic Collaboration – 1/5

- If the number of countries is 1, the number of organizations is counted:
  - Domestic-Single: only one organization
  - Domestic-Multiple: two or more organizations
- Both unified and non-unified organizations are considered
  - When an organization is not unified, the published name is used
  - When an organization is unified, the unified name is used
- For example, WOS:001325039300012, has 2 authors. One from Harvard University and one from Wentworth Inst Technol. The latter is non-unified organization but is taken into account, resulting in **Domestic-Multiple**

Zengel, K (Zengel, Keith) <sup>[1]</sup> ; Klales, A (Klales, Anna) <sup>[2]</sup>

Corresponding Address: Zengel, Keith (corresponding author)  
Wentworth Inst Technol, Boston, MA 02115 USA

E-mail Addresses :

[zengelk@wit.edu](mailto:zengelk@wit.edu)

Addresses :

<sup>1</sup> Wentworth Inst Technol, Boston, MA 02115 USA

<sup>2</sup> ▲ Harvard Univ, Cambridge, MA USA

Affiliation

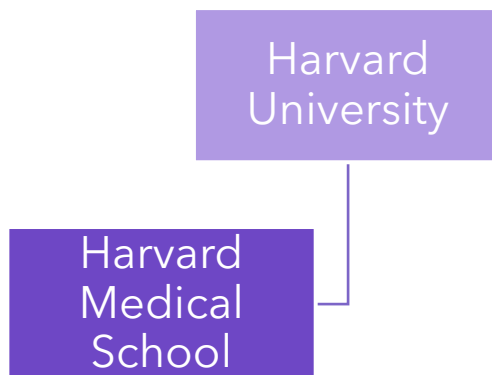
Harvard University

ROR ID: <https://ror.org/03vek6s52> ▼

# Collaboration Type - Methodology

## Domestic (parent-child relationships) – 2/5

- An address might resolve to multiple unified organizations
  - When there is a parent-child relationship, only the child organization(s) will be considered
  - Departments are always ignored
- For example, WOS:000606519500004, is **domestic-single**. Only “Harvard Medical School” is counted. “Harvard University” is a parent, and the other names are departments



Corresponding Address: Haigis, Marcia C. (corresponding author)

▲ Harvard Med Sch, Dept Cell Biol, Blavatnik Inst, Boston, MA 02115 USA

Affiliation

Harvard University **Parent organization not counted**

ROR ID: <https://ror.org/03vek6s52> ▼

Harvard Medical School

Harvard Medical School Blavatnik Institute **Departments are disregarded**

Harvard Medical School Department of Cell Biology

Corresponding Address: Haigis, Marcia C. (corresponding author)

▲ Harvard Med Sch, Ludwig Canc Ctr, Boston, MA 02115 USA

Affiliation

Harvard University

ROR ID: <https://ror.org/03vek6s52> ▼

Harvard Medical School

E-mail Addresses :

[Marcia\\_Haigis@hms.harvard.edu](mailto:Marcia_Haigis@hms.harvard.edu)

Addresses :

▲ <sup>1</sup> Harvard Med Sch, Dept Cell Biol, Blavatnik Inst, Boston, MA 02115 USA

Affiliation

Harvard University

ROR ID: <https://ror.org/03vek6s52> ▼

Harvard Medical School

Harvard Medical School Department of Cell Biology

Harvard Medical School Blavatnik Institute

▲ <sup>2</sup> Harvard Med Sch, Ludwig Canc Ctr, Boston, MA 02115 USA

Affiliation

Harvard University

ROR ID: <https://ror.org/03vek6s52> ▼

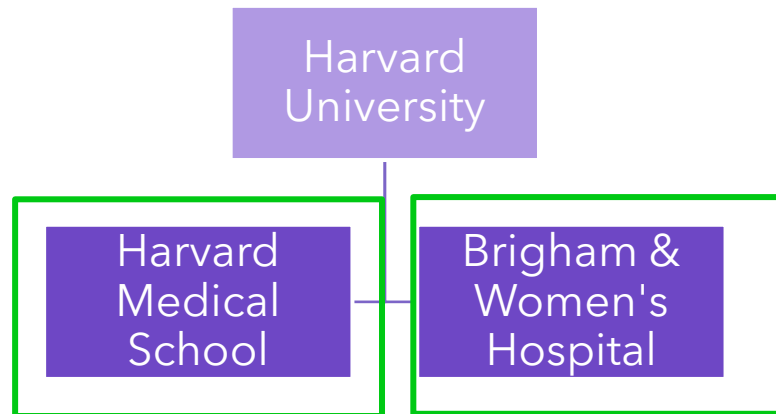
Harvard Medical School

E-mail Addresses :

# Collaboration Type - Methodology

## Domestic (parent-child relationships) – 3/5

- For example, WOS:000770361800073 is categorized as domestic-multiple
  - One address “Harvard Med Sch, Brigham & Womens Hosp, Boston, MA 02115 USA” resolved to 3 unified organizations, which have below child-parent relationship
  - Only the child organizations are considered. In this example, this results in 2 distinct organizations, hence **Domestic-Multiple**



### Addresses :

- 1 Harvard Med Sch, Brigham & Womens Hosp, Boston, MA 02115 USA

### Affiliation

Harvard University

Only count child unified organizations

ROR ID: <https://ror.org/03vek6s52>

1

Harvard Medical School

2

Brigham & Women's Hospital

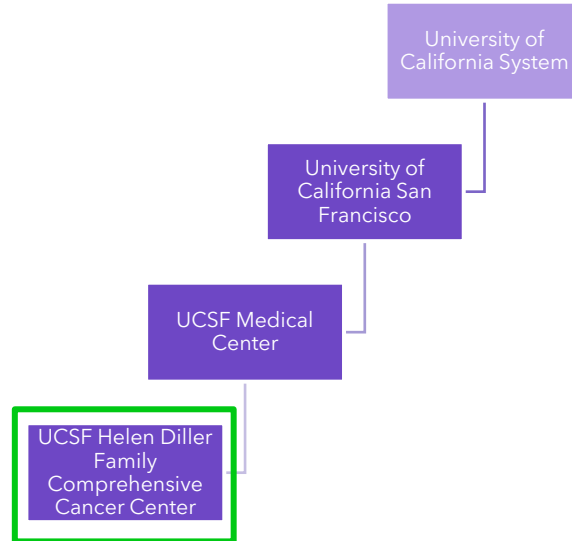
ROR ID: <https://ror.org/04py2rh25>



# Add an example, with 3 levels: parent- child - child

Domestic (parent-child relationships) – 4/5

- WOS:000581916800002 has 4 authors, all with the same address which is resolved to 4 unified organizations but categorized as **domestic-multiple** since there is only 1 child organization



Winkler, J (Winkler, Juliane) <sup>[1]</sup> ; Abisoye-Ogunniyan, A (Abisoye-Ogunniyan, Abisola) <sup>[1]</sup> ; Metcalf, KJ (Metcalf, Kevin J.) <sup>[1]</sup> ; Werb, Z (Werb, Zena) <sup>[1]</sup>

Addresses :

<sup>1</sup> Univ Calif San Francisco, Helen Diller Family Comprehens Canc Ctr, Dept Anat, San Francisco, CA 94143 USA

Affiliation

University of California System

ROR ID: <https://ror.org/00pjdza24> ▼

University of California San Francisco

ROR ID: <https://ror.org/043mz5j54> ▼

UCSF Medical Center

ROR ID: <https://ror.org/01t8svj65> ▼

UCSF Helen Diller Family Comprehensive Cancer Center

ROR ID: <https://ror.org/05yndxy10> ▼

University of California San Francisco School of Medicine

University of California San Francisco Department of Anatomy

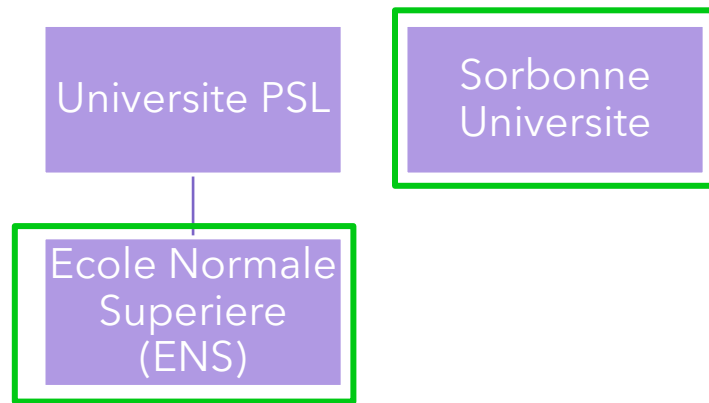
Only count child unified organizations

Departments not taken into account

# Add an example, with 3 levels: parent- child - child

Domestic (parent-child relationships) – 4/5

- WOS:000086021100001 has 1 author, 1 address and is classified as **domestic-multiple**



- ▲ Ecole Normale Super, Ecol Lab, UMR 7625, 46 Rue Ulm, F-75230 Paris 05, France

Affiliation

Universite PSL

Parent of ENS

ROR ID: <https://ror.org/013cjyk83> ▼

Ecole Normale Supérieure (ENS)

ROR ID: <https://ror.org/05a0dhs15> ▼

Sorbonne Universite

ROR ID: <https://ror.org/02en5vm52> ▼

Sorbonne University Faculty of Science and Engineering

Departments

Sorbonne University Earth Life and Environmental Sciences Research Section

Institute of Ecology and Environmental Sciences Paris

# Collaboration Type - Methodology

## Domestic (one author) – 4/4

- The number of authors is not considered
- For example, both WOS:000609007400010 and WOS:000522710600001 only have one author, but are classified as **domestic-multiple** because 2 organizations are identified

Corresponding Address: Decuypere, Mathias (corresponding author)

Educ Sci Res Grp, Methodol, Tiensestr 102 POB 03762, BE-3000 Leuven, Belgium

E-mail Addresses :

[mathias.decuypere@kuleuven.be](mailto:mathias.decuypere@kuleuven.be)

Addresses :

- 1 Katholieke Univ Leuven, Leuven, Belgium

Affiliation

KU Leuven

ROR ID: <https://ror.org/05f950310>

E-mail Addresses :

[mathias.decuypere@kuleuven.be](mailto:mathias.decuypere@kuleuven.be)

Corresponding Address: Wei, Tiwei (corresponding author)

- Interuniv Microelect Ctr, B-3001 Leuven, Belgium

Affiliation

Interuniversity Microelectronics Centre

ROR ID: <https://ror.org/02kcbn207>

Corresponding Address: Wei, Tiwei (corresponding author)

- Katholieke Univ Leuven, Leuven, Belgium

Affiliation

KU Leuven

ROR ID: <https://ror.org/05f950310>

E-mail Addresses :

[tiwei32@stanford.edu](mailto:tiwei32@stanford.edu)

Addresses :

- 1 Interuniv Microelect Ctr, B-3001 Leuven, Belgium

Affiliation

Interuniversity Microelectronics Centre

ROR ID: <https://ror.org/02kcbn207>

- 2 Katholieke Univ Leuven, Leuven, Belgium

Affiliation

KU Leuven

ROR ID: <https://ror.org/05f950310>

E-mail Addresses :

[tiwei32@stanford.edu](mailto:tiwei32@stanford.edu)



# Appendix - Indicators



<b>Collab-CNCI</b>	Normalized citation impact adjusted for subject, year, document type and collaboration type.
<b>Domestic Documents</b>	Number of publications for all domestic publications (both single- and multiple institutions within one country).
<b>International Documents</b>	Number of publications for all international collaborations (between institutions in different countries).
<b>% Domestic Documents</b>	Percentage of publications for all domestic publications (both single- and multiple institutions within one country).
<b>% International Documents</b>	Percentage of publications for all international collaborations (between institutions in different countries).
<b>Collab-CNCI Domestic</b>	Normalized citation impact for all domestic publications (both single- and multiple institutions within one country), adjusted for subject, year, document type and collaboration type.
<b>Collab-CNCI International</b>	Normalized citation impact for all international collaborations (between institutions in different countries), adjusted for subject, year, document type and collaboration type.

<b>Domestic Single Documents</b>	Number of publications from single-institution research within one country.
<b>Domestic Multiple Documents</b>	Number of publications from collaborations among multiple institutions within one country.
<b>International Bilateral Documents</b>	Number of publications from collaborations between institutions in two different countries.
<b>International Trilateral Documents</b>	Number of publications from collaborations between institutions in three countries.
<b>International Quadrilateral+ Documents</b>	Number of publications from collaborations between institutions in four or more countries.
<b>% Domestic Single Documents</b>	Percentage of publications from single-institution research within one country.
<b>% Domestic Multiple Documents</b>	Percentage of publications from collaborations among multiple institutions within one country.
<b>% International Bilateral Documents</b>	Percentage of publications from collaborations between institutions in two different countries.
<b>% International Trilateral Documents</b>	Percentage of publications from collaborations between institutions in three countries.
<b>% International Quadrilateral+ Documents</b>	Percentage of publications from collaborations between institutions in four or more countries.

<b>Collab-CNCI Domestic Single</b>	Normalized citation impact for single-institution research, adjusted for subject, year, document type and collaboration type.
<b>Collab-CNCI Domestic Multiple</b>	Normalized citation impact for collaborations among multiple institutions within one country, adjusted for subject, year, document type and collaboration type.
<b>Collab-CNCI International Bilateral</b>	Normalized citation impact for collaborations between institutions in two different countries, adjusted for subject, year, document type and collaboration type.
<b>Collab-CNCI International Trilateral</b>	Normalized citation impact for collaborations between institutions in three countries, adjusted for subject, year, document type and collaboration type.
<b>Collab-CNCI International Quadrilateral+</b>	Normalized citation impact for collaborations between institutions in four or more countries, adjusted for subject, year, document type and collaboration type.

<b>Industry Collaborations</b>	Number of publications with at least 2 organizations and one of them listing its organization type as corporate or global corporate.
<b>% Industry Collaborations</b>	Percentage of publications with at least 2 organizations and one of them listing its organization type as corporate or global corporate.
<b>Organization only Collaborations</b>	Deprecated, use 'Domestic Single' instead. Number of publications with at least 2 authors, from the same resolved organization. Unresolved organizations are disregarded, and when an address is resolved to multiple organizations, the relationship between them is also disregarded. When using Domestic Single instead, optionally combine with filter on 'Authors per Document' set to minimum 2.
<b>% Organization only Collaborations</b>	Deprecated, use '%Domestic Single' instead. Percentage of publications with at least 2 authors, from the same resolved organization. Unresolved organizations are disregarded, and when an address is resolved to multiple organizations, the relationship between them is also disregarded. When using Domestic Single instead, optionally combine with filter on 'Authors per Document' set to minimum 2.
<b>Domestic Collaborations</b>	Deprecated, instead use 'Domestic Multiple Documents'. Number of publications for all domestic publications with at least 2 authors and at least 2 distinct organizations, all in the same country. The published organization name is used, not the resolved organization name(s). When using Domestic Multiple instead, optionally combine with filter on 'Authors per Document' set to minimum 2.
<b>International Collaborations</b>	Deprecated, instead use 'International Documents'. Number of publications for all international collaborations with at least 2 authors and at least 2 different countries. When using 'International Documents', optionally combine with filter on 'Authors per Document' set to minimum 2.
<b>% Domestic Collaborations</b>	Deprecated, instead use '% Domestic Multiple Documents'. Percentage of publications for all domestic publications with at least 2 authors and at least 2 distinct addresses, all in the same country. When using Domestic Multiple instead, optionally combine with filter on 'Authors per Document' set to minimum 2.
<b>% International Collaborations</b>	Deprecated, instead use '% International Documents'. Percentage of publications for all international collaborations with at least 2 authors and at least 2 different countries. When using 'International Documents', optionally combine with filter on 'Authors per Document' set to minimum 2.