

# About DTU Research Analytics Platform (DTU RAP)

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## 1. Introduction

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DTU Research Analytics Platform (RAP) is an online service offering research analytics to the university's researchers, management, and administration. DTU RAP makes these research analytics available online, with short response times, and in some cases, with richer information than would be possible with a manual approach.

### 1.1. Motivation and aims

Many universities – especially in the areas of science, technology, medicine, and data-driven social sciences – use quantitative data as one of the inputs to their evaluation and planning processes, which also draw on qualitative assessments. Such bibliometrics/scientometrics traditionally deal with publications and the citations they receive from peers – as indicators of research output and impact.

DTU RAP aims at making such bibliometric/scientometric analysis

- as relevant as possible
- as clear as possible
- as precise as possible
- as open as possible
- as transparent as possible
- as reproducible as possible
- as reusable as possible

Hence, DTU RAP data, analytical concepts, software, and algorithms must address these requirements for quality as well as transparency and openness.

### 1.2. Overall data and technology choices

DTU RAP uses data from two commercially available databases: Web of Science and InCites – both are licensed by the university and accessible to all with a campus login – just like DTU RAP itself. The choice of data reflects DTU's long experience with Web of Science data as well as its coverage and quality when it comes to reflecting the university's research output. While the data is far from open access, it is commercially available to anyone who would like to reproduce the DTU RAP analytics – in order to check the validity or to set up a RAP for their own university.

While the “behind the firewall” nature of the DTU RAP services align well with the access rights of its data, other implementors may opt for a RAP with a greater degree open access and open data. This is an implementor's choice, and the RAP system may be adapted to accommodate such a choice.

The central software component is VIVO “*a member-supported, open source software and an ontology for representing scholarship. VIVO supports recording, editing, searching, browsing, and visualizing scholarly activity. VIVO encourages showcasing the scholarly record, research discovery, expert finding, network analysis, and assessment of research impact. VIVO is easily extended to support additional domains of scholarly activity.*” See more at <https://duraspace.org/vivo/>.

The software used and developed for the various RAP modules is entirely open source and available for all to download, apply, or adapt at <https://github.com/RAP-research-output-impact/rap-custom-vivo>. There are some variations in how the DTU RAP modules import and process data, these are outlined below, module by module.

### 1.3. Acknowledgement of contributors and funders

Many people and organizations have contributed (and still contribute) to DTU RAP.

#### Financial support

- DEFF – Denmark’s Electronic Research Library – has financially supported two projects encompassing VIVO development activities. After DEFF was discontinued in 2019, the [Danish Agency for Higher Education and Science](#) took over.
  - [ROI-AV](#): Research Output & Impact – Analyzed & Visualized, 2016-2018  
Work Package 3: VIVO as a Research Analytics Platform
  - [OPERA](#): Open Research Analytics, 2019-2020  
Work Package 1: Open university research analytics system – Research collaboration  
Work Package 4: Open university research analytics system – Research assessment

#### Data and API services

- [Benjamin Gross](#), Clarivate Analytics

#### Software development

- [Franck Falcoz](#), Vox Novitas
- [Ted Lawless](#), formerly Clarivate Analytics, now Brown University
- [Brian Lowe](#), Ontocale SRL

#### IT service and hardware

- [Michael Rasmussen](#) and [Martin Holmquist Schimmel](#) of the DTU IT Service department provide and support the server environment for DTU RAP

#### Bibliometric development and support

- [Christina Steensboe](#), [Karen Hytteballe Ibanez](#), Mette Fjeldhagen, Nikoline Dohm Lauridsen, and [Mogens Sandfær](#) – of the DTU Research Analytics Office.

## 2. External Collaboration Module – DTU Collaboration

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### 2.1. Purpose of module

The Collaboration Module of DTU RAP analyzes the collaboration between DTU and other organizations. It is possible to explore the collaboration at either the university or the department level by following one of four paths of exploration – world map, country, partner, or subject.

The final product of the Collaboration Module is a detailed collaboration report of the collaboration between DTU and a chosen partner organization to:

1. view online and exploit the many hyperlinks going deep into certain aspects
2. or to download as an offline spreadsheet.

The collaboration report provides an overview as well as details of the collaboration between DTU and the chosen partner organization. The report includes the following eight sections:

1. Collaboration overview
2. Compare key output and impact indicators
3. Compare annual publication and co-publication output
4. Compare partner's top subjects with DTU and co-publications
5. Compare top collaboration subjects with partner and DTU subjects
6. Collaboration by DTU department
7. Collaboration by DTU researcher (top 20)
8. Collaboration by funder (top 20)

A comprehensive introduction to the Collaboration Module can be found in [DTU RAP Collaboration Module Presentation](#).<sup>1</sup>

### 2.2. Data flow

There are two data sources for the Collaboration Module:

1. Web of Science for publication data pertaining to DTU's Organization-Enhanced in Web of Science
2. InCites for bibliometric indicator data pertaining to DTU's Organization-Enhanced in InCites and all its collaboration partners with an Organization-Enhanced in Web of Science/InCites

DTU RAP imports all the DTU affiliated data in Web of Science since 2007. The DTU affiliated data is isolated using the Web of Science unified organization name "Technical University of Denmark" (Organization-Enhanced).

Data from Web of Science for DTU are stored in VIVO as RDF (Research Description Framework) triples in a triple store. The triples compose a graph of connections between discrete entities such as persons, publications, organizations, departments, and countries. These entity types and their relationships are defined in the VIVO Ontology. Some minor extensions have been added to this ontology to represent details of the Web of Science data.

In order to produce a useful overview of publications and collaboration at the department level, the DTU Research Analytics Office maintains mapping tables unifying the many name variants found in publications. While this effort successfully unifies close to three thousand department name variants

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<sup>1</sup>[http://rap.adm.dtu.dk/vivo/PDF/DTU\\_RAP\\_Collaboration\\_24-Sep-2019.pdf](http://rap.adm.dtu.dk/vivo/PDF/DTU_RAP_Collaboration_24-Sep-2019.pdf)

into a short list of current (and a few former) DTU departments, a number of department affiliations remain undeclared or unclear and are mapped to “DTU department unknown”.

In addition to the data retrieved from Web of Science for DTU, bibliometric indicators for entire organizations are retrieved from InCites for DTU and the collaborating organizations.

A detailed walk-through of the data flow including data loading, enhancing, and storing can be found in the report [\*Web of Science & InCites Data for VIVO Research Analytics Platform \(VIVO RAP\)\*](#).<sup>2</sup>

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<sup>2</sup>[https://figshare.com/articles/Web\\_of\\_Science\\_InCites\\_Data\\_for\\_VIVO\\_Research\\_Analytics\\_Platform\\_VIVO\\_RAP/\\_11743341](https://figshare.com/articles/Web_of_Science_InCites_Data_for_VIVO_Research_Analytics_Platform_VIVO_RAP/_11743341)

### 3. Publication Search Module – DTU Publications

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#### 3.1. Purpose of module

The Publication Module of DTU RAP is a search interface for DTU's Web of Science publications. It includes nine different facets:

1. Subject categories
2. Document types
3. Publication years
4. Org.-Enhanced
5. Journals
6. Conferences
7. Countries
8. Funding agencies
9. DTU departments

The facets enable the user to refine the search result to e.g. a certain year, subject category, and/or DTU department.

#### 3.2. Data flow

The Publication Module includes DTU's Web of Science publications since 2007. The DTU RAP Collaboration Module is based on these publications.

## 4. Researcher Profile Module – DTU Researchers

### 4.1. Purpose of module

The Researchers Module of DTU RAP includes researcher profiles for researchers affiliated to DTU based on publications found via their ORCID and ResearcherIDs in Web of Science.

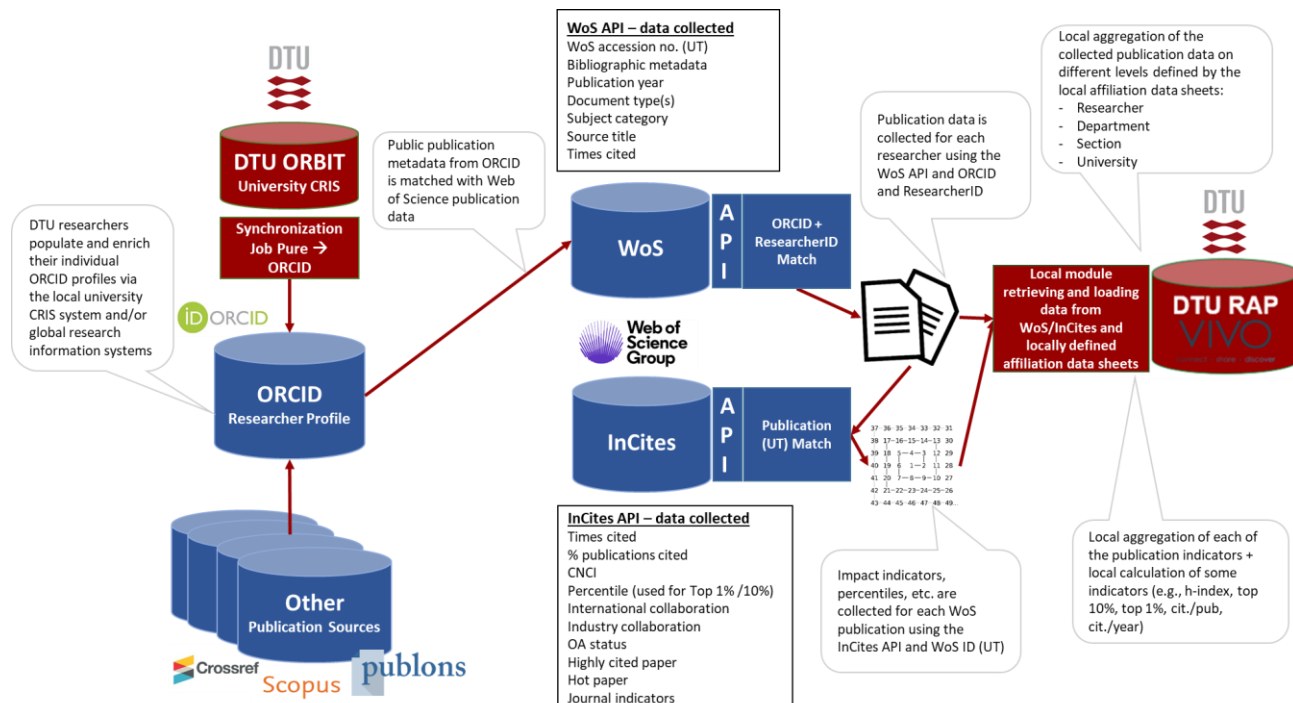
The main purpose of the module is to provide DTU's researchers with an overview of their research output and impact based on publications and citations found in Web of Science.

### 4.2. Data flow

The Researchers Module is based on data retrieved from two Clarivate platforms:

1. Web of Science for publication data pertaining to each DTU researcher's ORCID and ResearcherID for all active publication years.
2. InCites for bibliometric indicator data pertaining to the publications retrieved from Web of Science and matched by the Web of Science ID (UT) of each publication.

To make the Researchers Module as open as possible – and at the same time being able to automate the data load process – the Researchers Module is only based on publication data that can be found through the researcher persistent identifiers ORCID and ResearcherID. For the researcher to be accurately represented in the Researchers Module, the researcher is required to ensure that his/her public publication list in ORCID.org is up-to date at all times. A detailed data flow is described in the following figure.



The ORCID IDs and Researcher IDs used to retrieve publication and citation data from Web of Science/InCites come from a locally defined affiliation Excel file for each DTU department, which is updated annually starting in 2020 by the departments.

#### 4.3. All DTU researchers

Includes a list of all DTU researchers available from the locally defined affiliation Excel department sheets. The list includes the following information, which in addition serve as both sortable and searchable facets:

1. Name
2. ORCID
3. Email
4. Department
5. Job title

#### 4.4. Researcher profile

A researcher profile displays:

1. **Master data:** Name, ORCID, ResearcherID, email, year of earliest/latest Web of Science publication, start year of DTU affiliation, and PhD year.
2. **DTU affiliations and positions:** List of DTU affiliations and positions since 2020. The information is updated annually by the departments.
3. **Statistics on Web of Science publications:** Retrieved using ORCID and ResearcherID. The numbers are provided per publication type.
  - a. Please note that a publication may be assigned to more than one publication type.
  - b. The publication type "Other" can include Editorials, Notes, Letters, Discussions, Bibliographies, Book reviews, Software reviews, News items, Reprints, and Retractions.
4. **Link to a list of the researcher's Web of Science publications:** As retrieved by ORCID and ResearcherID.
5. **Publications and citations per year:** Graph of the annual number of publications and citations. Times cited = total number of citations received thus far for the publications published in a specific year.
6. **Metrics based on these publications:** You may set the publication timespan and filter for publication types.

The table displays:

- a. Total number of publications retrieved from Web of Science.
- b. Total number of citations retrieved from Web of Science.
- c. The average number of citations per publication.
- d. The average number of citations per active publication year.
- e. The h-index for the publication set. Example: Researcher A has an h-index of 13 if he/she has published at least 13 documents for which he/she has received at least 13 citations.
- f. International collaboration: The percentage of publications with international co-authors.
- g. Open Access: The percentage of publications with Open Access to the full text.

#### 4.5. List of publications

The list of Web of Science publications is displayed by year, from the newest publication to the oldest.

The full list of publications offers five filters:



1. **Year:** Refines the publication list to a particular publication year.
2. **Type:** Refines the publication list to the publication type selected.
3. **Affiliation:** Refines the publication list to DTU or non-DTU affiliated publications (based on DTU Organization-Enhanced in Web of Science).
4. **Citation impact:** Refines the publication list according to four citation impact indicators: Top 10%, Top 1%, above or below world average (according to the InCites Category Normalized Citation Impact (CNCI)).
5. **Open Access:** Refines the publication list to Open Access or not Open Access.

#### 4.6. Publication record

From the publication list of a researcher or a unit, it is possible to go to the publication record by clicking on the title of the publication. The first part of the publication record displays all bibliographic metadata retrieved for the publication from Web of Science. The second part of the publication record includes 15 publication level indicators from InCites – under the heading “InCites indicators”, which can be expanded.

1. **Times Cited:** Number of citations in InCites.
2. **Category Normalized Citation Impact (CNCI):** Citation impact (citations per publication) normalized for subject, year, and publication type. A CNCI value of one represents performance at par with world average, values above one are considered above average and values below one are considered below average.
3. **In top 10%:** Percentage of publications in the top 10% most cited based on citations by subject, year, and publication type (Y/N indicator). Based on Percentile in Subject Area.
4. **In top 1%:** Percentage of publications in the top 1% most cited based on citations by subject, year, and publication type (Y/N indicator). Based on Percentile in Subject Area.
5. **Percentile in Subject Area:** Ranking of a publication against all other publications in equivalent subjects, year, and publication type. If the percentile is > or = 99 the publication belongs in top 1%. If the percentile is > or = 90 the publication belongs in top 10%.
6. **Industry Collaboration:** If at least one co-author is industry affiliated (Y/N indicator).
7. **Institution Collaboration:** If at least one co-author is institution affiliated (Y/N indicator).
8. **International Collaboration:** If at least one co-author is international (Y/N indicator).
9. **Open Access:** If the publication is Open Access (Y/N indicator).
10. **Highly Cited Paper:** If the publication is classified as a “Highly Cited Paper” in Essential Science Indicators (Y/N indicator). Highly Cited Papers received enough citations during the past two months to place them in the top 1% of their academic fields based on a highly cited threshold for the field and publication year.
11. **Hot Paper:** If the publication is classified as a “Hot Paper” in Essential Science Indicators (Y/N indicator). Hot Papers were published in the past two years and received enough citations during the past two months to place them in the top 0.1% of papers in their academic fields.
12. **Category Expected Citations:** The expected number of citations calculated from all publications in equivalent subjects, year, and publication type. Used when calculating CNCI.
13. **Journal Impact Factor:** Is defined as all citations to the journal in the current year to items published in the previous two years, divided by the total number of scholarly items (these comprise articles, reviews, and proceedings papers) published in the journal in the previous two years.
14. **Journal Normalized Citation Impact (JNCI):** Is similar to the CNCI, but instead of normalizing for subject, it normalizes the citation rate for the journal in which the document is published.
15. **Journal Expected Citations:** The expected number of citations calculated from all publications in the same journal, year, and publication type. Used when calculating JNCI.

All indicators in the Researchers Module are based on calculations from InCites including the

Emerging Sources Citation Index (ESCI).

For a more detailed understanding of the indicators and metrics included in DTU RAP please see [\*Using InCites responsibly: a guide to interpretation and good practice\*](#).<sup>3</sup>

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<sup>3</sup> <https://spiral.imperial.ac.uk/handle/10044/1/75946>

## 5. Organizational Unit Profile Module – DTU Units

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### 5.1. Purpose of module

The Units Module of DTU RAP includes the different units within DTU distributed by university, department, and section. The primary aim of the module is to support evaluation and assessment of the university's departments and sections.

### 5.2. Data flow

The Units Module is based on the same publications, citations, and metrics as the Researchers Module. For a detailed view of the data flow go to chapter 4.2.

### 5.3. All DTU units

Includes an overview of the different DTU units – going from university level to more detailed department structures. Select the university, a department, or a section to see metrics and publications.

### 5.4. Unit profile

A unit profile displays:

1. **Head:** Link to head of unit.
2. **Researchers:** Link to a list of the unit's researchers.
3. **Statistics on Web of Science publications:** Retrieved using ORCID IDs and Researcher IDs. The numbers are provided per publication type.
  - a. Please note that a publication may be assigned to more than one publication type.
  - b. The publication type "Other" can include Editorials, Notes, Letters, Discussions, Bibliographies, Book reviews, Software reviews, News items, Reprints, and Retractions.
4. **Link to a list of the unit's Web of Science publications:** As retrieved by ORCID IDs and Researcher IDs.
5. **Publications and citations per year:** Graph of the annual number of publications and citations. Times cited = total number of citations received thus far for the publications published in a specific year.
6. **Metrics based on these publications:** You may set the publication timespan and filter for publication types.

The table displays:

- a. Total number of publications retrieved from Web of Science.
- b. Total number of citations retrieved from Web of Science.
- c. The average number of citations per publication.
- d. The average number of citations per active publication year.
- e. The h-index for the publication set. Example: Unit A has an h-index of 13 if it has published at least 13 documents for which it has received at least 13 citations.
- f. Percentage of the publications that has at least one citation.
- g. The Category Normalized Citation Impact (CNCI) for the publication set. A CNCI value of one represents performance at par with world average, values above one are considered above average and values below one are considered below average.
- h. Percentage of publications in the top 10% most cited based on citations by subject, year, and publication type.
- i. Percentage of publications in the top 1% most cited based on citations by subject, year, and publication type.
- j. International collaboration: The percentage of publications with international co-

authors.

- k. **Open Access:** The percentage of publications with Open Access to the full text.

## 5.5. List of publications

The list of Web of Science publications is displayed by year, from the newest publication to the oldest.

The full list of publications offers four filters:

1. **Year:** Refines the publication list to a particular publication year.
2. **Type:** Refines the publication list to the document type selected.
3. **Affiliation:** Refines the publication list to DTU or non-DTU affiliated publications (based on DTU Organization-Enhanced in Web of Science).
4. **Citation impact:** Refines the publication list according to four citation impact indicators: Top 10%, Top 1%, above or below world average (according to the InCites Category Normalized Citation Impact (CNCI)).
5. **Open Access:** Refines the publication list to Open Access or not Open Access.

## 5.6. Full view of single publication

From the publication list of a researcher or a unit, it is possible to go to the publication record by clicking on the title of the publication. The first part of the publication record displays all bibliographic metadata retrieved for the publication from Web of Science. The second part of the publication record includes 15 publication level indicators from InCites – under the heading “InCites indicators”, which can be expanded.

1. **Times Cited:** Number of citations in InCites.
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3. **In top 10%:** Percentage of publications in the top 10% most cited based on citations by subject, year, and publication type (Y/N indicator). Based on Percentile in Subject Area.
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5. **Percentile in Subject Area:** Ranking of a publication against all other publications in equivalent subjects, year, and publication type. If the percentile is > or = 99 the publication belongs in top 1%. If the percentile is > or = 90 the publication belongs in top 10%.
6. **Industry Collaboration:** If at least one co-author is industry affiliated (Y/N indicator).
7. **Institution Collaboration:** If at least one co-author is institution affiliated (Y/N indicator).
8. **International Collaboration:** If at least one co-author is international (Y/N indicator).
9. **Open Access:** If the publication is Open Access (Y/N indicator).
10. **Highly Cited Paper:** If the publication is classified as a “Highly Cited Paper” in Essential Science Indicators (Y/N indicator). Highly Cited Papers received enough citations during the past two months to place them in the top 1% of their academic fields based on a highly cited threshold for the field and publication year.
11. **Hot Paper:** If the publication is classified as a “Hot Paper” in Essential Science Indicators (Y/N indicator). Hot Papers were published in the past two years and received enough citations during the past two months to place them in the top 0.1% of papers in their academic fields.
12. **Category Expected Citations:** The expected number of citations calculated from all publications in equivalent subjects, year, and publication type. Used when calculating CNCI.

13. **Journal Impact Factor:** Is defined as all citations to the journal in the current year to items published in the previous two years, divided by the total number of scholarly items (these comprise articles, reviews, and proceedings papers) published in the journal in the previous two years.
14. **Journal Normalized Citation Impact (JNCI):** Is similar to the CNCI, but instead of normalizing for subject, it normalizes the citation rate for the journal in which the document is published.
15. **Journal Expected Citations:** The expected number of citations calculated from all publications in the same journal, year, and publication type. Used when calculating JNCI.

All indicators in the Units Module are based on calculations from InCites including the Emerging Sources Citation Index (ESCI).

For a more detailed understanding of the indicators and metrics included in DTU RAP please see [Using InCites responsibly: a guide to interpretation and good practice](https://spiral.imperial.ac.uk/handle/10044/1/75946).<sup>4</sup>

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