

Rotunde, 13:45-15:00

Measuring impact performance

Floortje Flipppo (Chair)

Milosz Rojek

Joeri Both



Impact of Science

5-7 June 2019, Berlin

Measuring impact performance

Floortje Flippo (Chair)

*Regional Research Solutions Director,
Elsevier, The Netherlands*



Impact of Science

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Milosz Rojek

*Counsellor to the Minister of
Science and Higher Education, Poland*

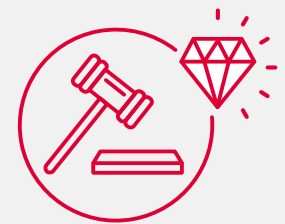
Impact on Society and the Economy in the Poland's New Model of Research Quality Assessment

Miłosz Rojek, Ministry of Science and Higher Education, Poland

www.gov.pl/web/science

Agenda

- 1. The new Polish Law on Higher Education and Science**
– comprehensive reform of the science and higher education system
- 2. Research Quality Assessment – the focal point of the reform**
- 3. Research impact evaluation – fundamental principles**



1.1. The “Law 2.0” Competition

- 3 grants (1M PLN each) for policy analysis and research in higher education and science regulations
- consultations within the academic community required
- outputs to be delivered: fundamental principles of the “Law 2.0” and a summary of the results of consultations
- proposals submitted by 15 research teams in response to the call
- public presentation of the principles by 3 grant-awarded teams at the Warsaw University of Technology



1.2. Constitution for Science

Assumptions of the regulatory reform of science and higher education in Poland

the scope of 4 hitherto separate acts
to be covered by the new law:

- Higher Education Act
- Act on the Academic Degrees and Academic Title
- Act on the Principles of Science Financing
- Student Loans and Credits Act

only the most important, systemic
issues to be regulated by the new
law, leaving more autonomy to
the HEIs and RIs (who can adopt
internal rules and regulations for
more detailed arrangements)

The new law called “Constitution for Science”

1.3. Thematic Conferences and Peer Review within H2020 PSF

Internationalisation – opportunities
and challenges for Polish HEIs
University of Rzeszów, Oct. 2016

Development of the social sciences
and humanities in Poland
Nicolaus Copernicus University in
Toruń, Nov. 2016

Collaboration between science,
business and public administration
for innovations
Wrocław University of Science and
Technology, Dec. 2016

Career paths and the advancement
of young researchers
University of Silesia in Katowice,
Jan. 2017

**Research excellence: how to catch
up with the best**
Adam Mickiewicz University in
Poznań, Feb. 2017

Teaching excellence: how to
orientate HEIs on teaching quality
John Paul II Catholic University of
Lublin, March 2017

Diversity in models of HEIs and RIs:
direction and instruments of the
change
Gdańsk University of Technology,
April 2017

Financing of science and higher
education
HEIs of Łódź, May 2017

Regime and governance of HEIs
University of Warsaw, June 2017

Simultaneously, **peer review of Poland's Higher Education and Science system** in the framework of
the Horizon 2020 Policy Support Facility

1.4. The New Law on Higher Education and Science

- 1st draft of the new law presented during the National Congress of Science in Kraków, Sep. 2017
- the draft law developed in a consultative process, with the active participation of the academic community and other stakeholders
- approx. 3,000 remarks and opinions received in the course of the formal public consultations
- the final draft adopted by the Council of Ministers in March 2018
- the new law passed by the parliament on July 20, 2018



2.1. The New Model of Research Quality Assessment

- Research quality assessment central to the reform of the science and higher education system:
 - all HEIs and a large part of RIs (excl. Łukasiewicz Research Network) employing at least 12 scientists (FTE) who carry out research in a given discipline (~OECD second-level fields of science) subject to the assessment (approx. 1,200 discipline-institutions)
- The forthcoming assessment will be conducted in 2021 and will cover the period 2017 to 2020
- Three assessment criteria with the weightings varying between broad fields of science



2.2. Assessment Criteria and Weights by Fields of Science



Assessment criteria	Social Sciences and Humanities (incl. Theology)	Natural Sciences, Medical and Health Sciences	Engineering and Technology, Agricultural and Veterinary Sciences	The Arts
Quality of research outputs and development works or artistic works (publications, patents, art works)	70%	60%	50%	80%
R&D income (grants awarded by the competitive procedure, revenues from R&D commercialisation)	10%	20%	35%	-
Impact of research on society and the economy	20%	20%	15%	20%

2.3. Research Quality Assessment: Ratings and Implications

- Every institution will be rated in each of disciplines subject to assessment (FTE \geq 12)
 - the rating scale: A+ (best), A, B+, B, C (worst)
- **Allocation of research block grants** based on results of the research quality assessment
 - no research block grants for disciplines rated C
- Institutions authorised to **confer scientific degrees** and to **conduct doctoral schools** only in these disciplines, which received a rating not lower than B+
- HEIs which
 - were subject to research quality assessment in at least 6 disciplines (*medical universities – 3*),
 - haven't received a rating lower than B+ in any of the disciplines and
 - have been awarded a rating not lower than A in at least half of disciplines (*medical universities – more than half*)

can enter the competition in the framework of the **“Excellence Initiative – Research University”** programme

3.1. Impact of Research: What was assessed before?

- 
- Criterion of “Other effects of research” (other than practical effects) in the previous research assessment model:
 - weighting from 10% (STEM and life sciences) to 15% (SSH and the arts)
 - “Application of the results of the R&D works of high social impact” assessed within the criterion...
 - but also publications of major importance for the development of science, culture, art or national heritage; organisation of (international) conferences; disseminating knowledge; popularising science; (international) research collaboration included in the criterion
- 

3.2. Impact of Research: What is to be assessed now?

Impact of research on:

- the economy,
- public policy and services,
- health care,
- culture and art,
- protection of the natural environment,
- public security (incl. national defence),
- other areas of social development

as a separate criterion with the research quality assessment.

3.3. Impact of Research: How it is to be assessed

- **Case studies** demonstrating **evidence of impacts** (reports, scientific publications, citations etc.) achieved during the assessment period that are underpinned by research in the period from 20 years before the assessment period to the end of this period



- Assessment of case studies based on the expert judgement



3.4. Impact of Research:

No of case studies to be submitted



FTE ≤ 100



2



100 < FTE ≤ 200



3



200 < FTE ≤ 300



4



FTE > 300



5

Expected number of case studies to be submitted in 2021
– not less than 2,700.

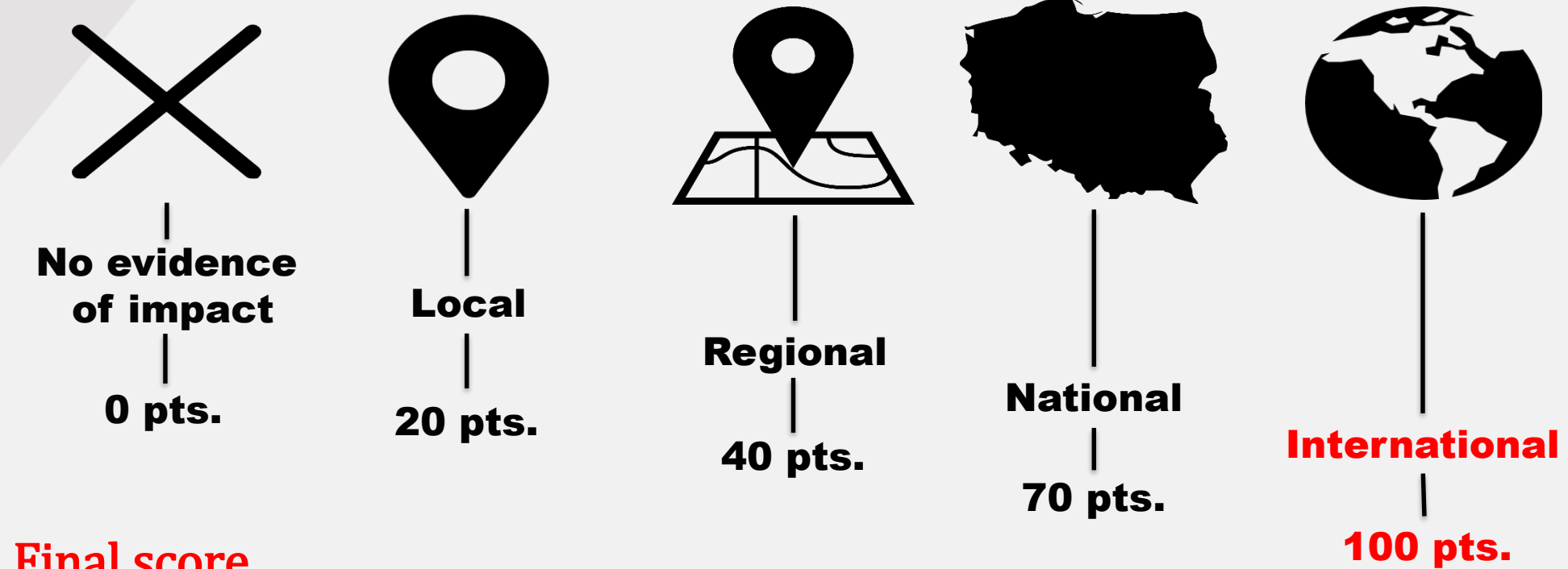
3.5. Impact of Research:

No of case studies to be submitted

However, there is an opportunity to submit more case studies:

- institutions assessed in disciplines within **SSH** can submit **3 additional case studies** describing impacts underpinned by outstanding scholarly books, biographical and bibliographical dictionaries etc.;
- institutions assessed in disciplines within **engineering and technology** can submit **2 additional case studies** describing impacts underpinned by architectural designs, urban development projects and spatial development plans;
- institutions which established **an SPV to commercialise the R&D** can submit **2 additional case studies** describing impacts underpinned by operations of the SPV.

3.6. Impact of Research: Reach and Significance



Final score

$$= \frac{\text{sum of points for all case studies}}{\text{N}^\circ \text{ of required case studies} + \text{N}^\circ \text{ of optional case studies submitted}}$$

3.7. Impact of Research: Crossing Boundaries





- Each case study submitted in Polish and English and assessed by a Polish expert and a foreign expert
- Extra **20 pts.** to be awarded to case studies underpinned by ground-braking **interdisciplinary** research

3.8. Impact of Research: Testing the Model of Assessment

- Although the weighting of the research impact is not more than 20%, it is considered by the government an important part of the research quality assessment
 - ⇒ showing the research impact to the public at large gives the government a mandate for a rise in science funding
- A careful design of the research impact assessment is required for the proper performance of this exercise
 - ⇒ the pilot impact assessment, covering 3 HEIs (Nicolaus Copernicus University in Toruń, West Pomeranian University of Technology in Szczecin, Academy of Art in Szczecin) and 42 out of 47 disciplines, has been launched.

3.9. Impact of Research: Schedule of the Pilot Assessment

- 
- Guidance on the research impact submission (including the template), guidance on the research impact assessment – June 2019
 - Comments from the experts – 2019Q3
 - Workshops at HEIs – November 2019
 - Submission of case studies (at least one for each discipline) – February 2020
 - Assessment of case studies by the experts – March 2020
 - Comments from the participants of the pilot assessment – April 2020
 - Final report – 2020Q2
- 

Thank you for your attention!

CFS CONSTITUTION
FOR SCIENCE

ul. Hoża 20, ul. Wspólna 1/3
00-529 Warszawa, Poland

tel. +48 (22) 529 27 18

fax +48 (22) 628 09 22

www.gov.pl/web/science



Impact of Science

5-7 June 2019, Berlin

Measuring impact performance

Joeri Both

*Head of Research Support, University Library,
VU Amsterdam, The Netherlands*

MEASURING SOCIETAL IMPACT AND VALUE AND REWARD – JOERI BOTH



SHORT INTRODUCTION



- Trained as biomedical scientist
- PhD from University of Amsterdam
- Moved to the Netherlands Cancer Institute as head of medical library
- As of July 2017 Head of Research Support at the Vrije Universiteit Amsterdam
- Twitter: [Joeri_VU](#)

THE TWO APPROACHES



2015: OCCUPATION/STRIKE; AGAINST THE PERFORMANCE DELIVERY CULTURE OF SCIENCE AND EDUCATION | SPARKED DISCUSSION IN NL UNIVERSITIES



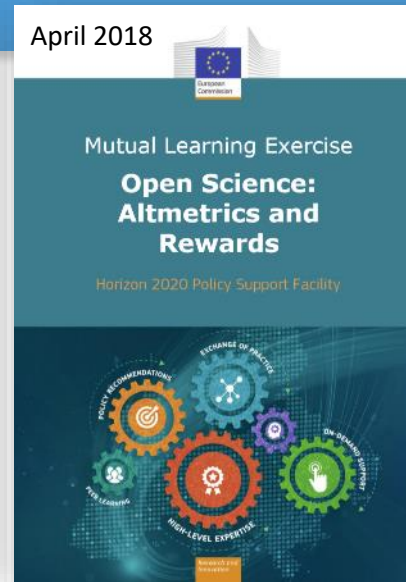
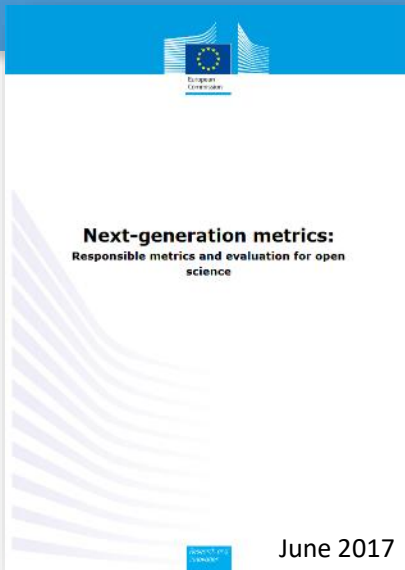
Photo by: Jos van Zetten

<https://www.at5.nl/artikelen/142130/UvA%20raamt%20schade%20Maagdenhuisbezetting%20op%20460.000%20euro>

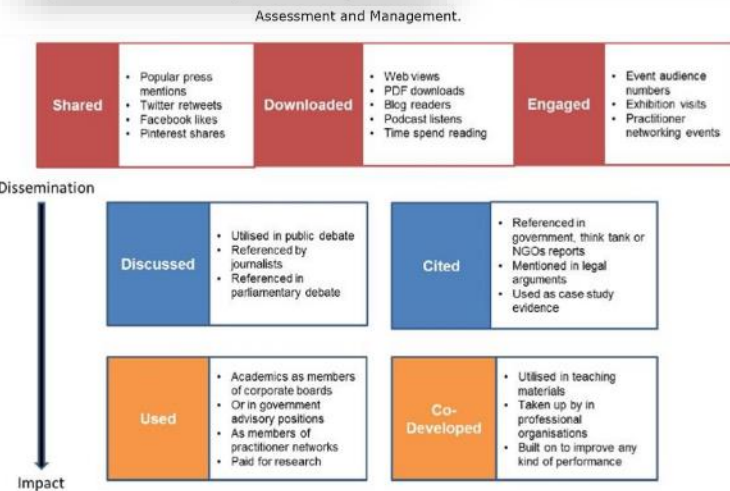
TRANSITION IN VALUING RESEARCH: METRIC TIDE, LEIDEN MANIFESTO, ...



Figure 3: The Metric Tide: Report of the Independent Review of the Role of Metrics in Research



- Indicator(en)
- Omslag onderzoeksuitgaven overheden PKO's (par 3.1.1)
- Deelname N. aan "Societal Challenges" (aantal) geld (par 3.1.2)
- Regionale ecosystemen: hotspots en campussen (par 3.2.1)
- Financiering PPS en topsectoren (par 3.2.2)
- Samenwerking en Co-publicaties univ-industrie (par 3.2.3)
- Netwerken lectoraten (par 3.2.4)
- Valorisatie-infrastructuur (par 3.2.5)
- Patenten (par 3.2.6)



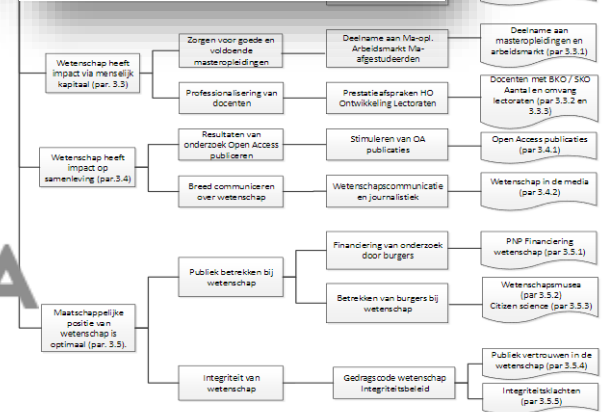
Source: Wildson, 2016

- > 1) Quantitative evaluation should support qualitative, expert assessment.
- > 2) Measure performance against the research missions of the institution, group or researcher
- > 3) Protect excellence in locally relevant research.
- > 4) Keep data collection and analytical processes open, transparent and simple.
- > 5) Allow those evaluated to verify data and analysis.
- > 6) Account for variation by field in publication and citation practices.
- > 7) Base assessment of individual researchers on a qualitative judgement of their portfolio
- > 8) Avoid misplaced concreteness and false precision.
- > 9) Recognize the systemic effects of assessment and indicators
- > 10) Scrutinize indicators regularly and update them.

[https://rio.jrc.ec.europa.eu/en/library/mle-open-science-
altmetrics-and-rewards-final-report](https://rio.jrc.ec.europa.eu/en/library/mle-open-science-altmetrics-and-rewards-final-report)



April 18th 2019,
NWO, ZonMW, KNAW
Sign the DORA agreement
<http://sfdora.org/>



Knowledge ecosystem
[https://www.rathenau.nl/nl/kennisecosystem/
m/balans-van-de-wetenschap-2018](https://www.rathenau.nl/nl/kennisecosystem/balans-van-de-wetenschap-2018)



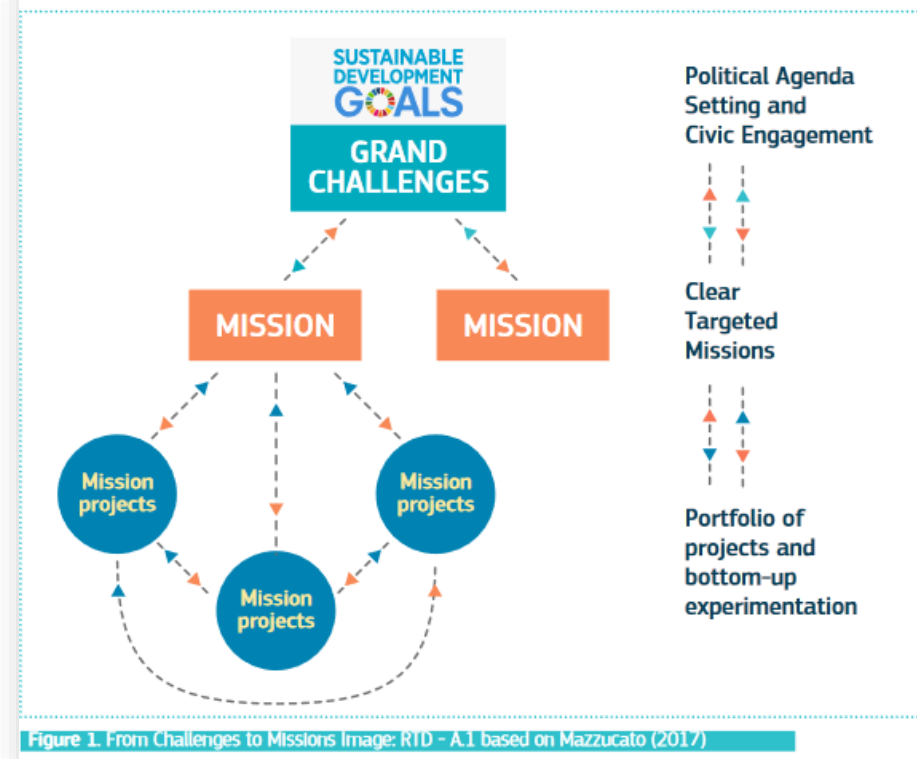
<https://responsiblemetrics.org/the-metric-tide/>

<http://www.leidenmanifesto.org/>

RESEARCH FUNDING INCREASINGLY FOCUS ON MISSION-ORIENTED INNOVATIONS [RELEVANT FOR SOCIETY, ACROSS DISCIPLINES]



Figure 1 below illustrates the movement from broad challenges to specific missions.



Source:

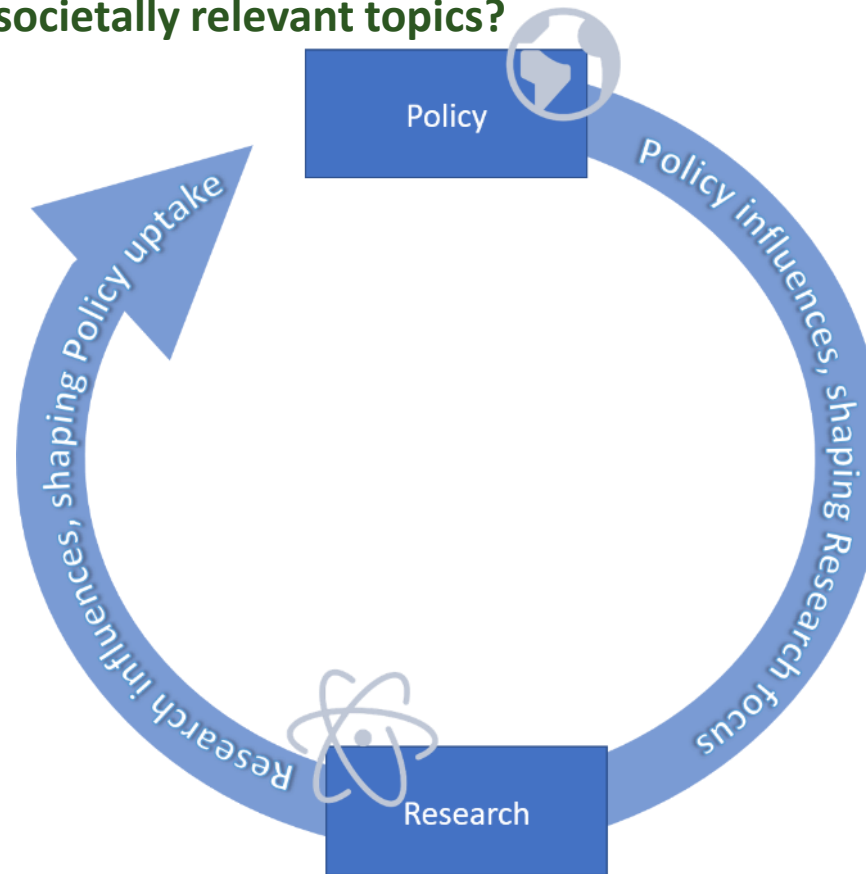
https://ec.europa.eu/info/sites/info/files/mazzucato_report_2018.pdf

VU: “HOW CAN WE SHOW SOCIETAL IMPACT ON SOCIETALLY RELEVANT TOPICS?”

What are those societally relevant topics?



What research are we doing within these societally relevant topics?



Is this research on societally relevant topics, actually influencing policy of societal relevant organisations?

MOVEMENT TOWARDS ADOPTING SDG'S AS A FRAMEWORK FOR A NEW NARRATIVE

The SDG Accord

The University and College Sector's Collective Response to the Global Goals

www.sdgaccord.org

Annual report to the United Nations High-level Political Forum on Sustainable Development (HLPF) as part of the SDG Accord mandatory institutional reporting

New York, 11th July 2018

Global universities, colleges and students leading delivery of the UN Sustainable Development Goals



Led by a Global Alliance of university and college sustainability networks

Search [] NL EN Dutch Universities Publications About VSNU CAO

The Association of Universities in the Netherlands

Contribution and solutions for societal challenges with the highest quality of education and research

Click on the goals below for more information

A new guide aims to help universities accelerate action on the SDGs

22 August, 2017 | Australia , New Zealand , Pacific , Publications , Universities & SDGs

GETTING STARTED WITH THE SDGS IN UNIVERSITIES

A GUIDE FOR UNIVERSITIES, HIGHER EDUCATION INSTITUTIONS, AND THE ACADEMIC SECTOR



Sustainability Science in a Global Landscape

Dignity | People | Prosperity
Planet | Justice | Partnership

AESIS

NETWORK FOR ADVANCING & EVALUATING THE SOCIETAL IMPACT OF SCIENCE

DORA

San Francisco Declaration on Research Assessment

Find out more at:
pwc.com/globalgoals

AURORA

“Aurora institutions are committed to working together to find solutions to globally relevant problems”



UNIVERSITY OF ICELAND



UNIVERSITY OF GOTHENBURG



VRJIE UNIVERSITEIT AMSTERDAM



University of Antwerp



Offen im Denken



COLLABORATION WITH INTERNATIONAL GROUP OF BIBLIOMETRICIANS



Antwerp Dec 2018; Joeri, Susanne,
Pam, Lars, Felix, Hubert, Raf, René.
Not in picture: Eike, Susana, Nykohla,
Jaqui, Baldvin

3 GOOD HEALTH AND WELL-BEING

3.3 By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases

Collaborative effort in converting UN policy texts to bibliometric search strings, reviewing & testing results, and data acquisition

- 3.3.1 Number of new HIV infections per 1,000 uninfected population, by sex, age and key populations
- 3.3.2 Tuberculosis incidence per 1,000 population
- 3.3.3 Malaria incidence per 1,000 population
- 3.3.4 Hepatitis B incidence per 100,000 population
- 3.3.5 Number of people requiring interventions against neglected



Query for SDG 03 good health and well-being

From Targets and Indicators on <https://sustainabledevelopment.un.org/sdg3>

Needs improvement!



```

("mortality" AND ("suicid*" OR "premature" OR "maternal" OR "neonatal" OR "under-five" OR ("under" AND "five"))) OR
("malaria" OR "hepatitus b" OR "hiv" OR "aids" OR "tropical disease*" OR "zika" OR "ebola") OR
("abuse" AND ("substance*" OR "drug*" OR "alcohol")) OR
("road traffic" AND ("injur*" OR "death*" OR "accidents" )) OR
"family planning" OR
"adolescent birth rate" OR
(("health") AND ("large household") AND ("expenditur*" OR "income*")) OR
(("mortality") AND ("pollution" OR "unsafe" OR "poisoning") AND ("water" OR "air" OR "sanitation" OR "hygiene")) OR
(("health") AND ("tobacco") AND ("prevalence")) OR (("national") AND ("vaccine*") AND ("programme*")) OR
(("health worker*") AND ("density" OR "distribution*")) OR
"International Health Regulation*" OR
"health emergency preparedness"

```

PROCESSING SDG QUERIES & COLLECTING DATA

Query Crafting



Basic topic extraction

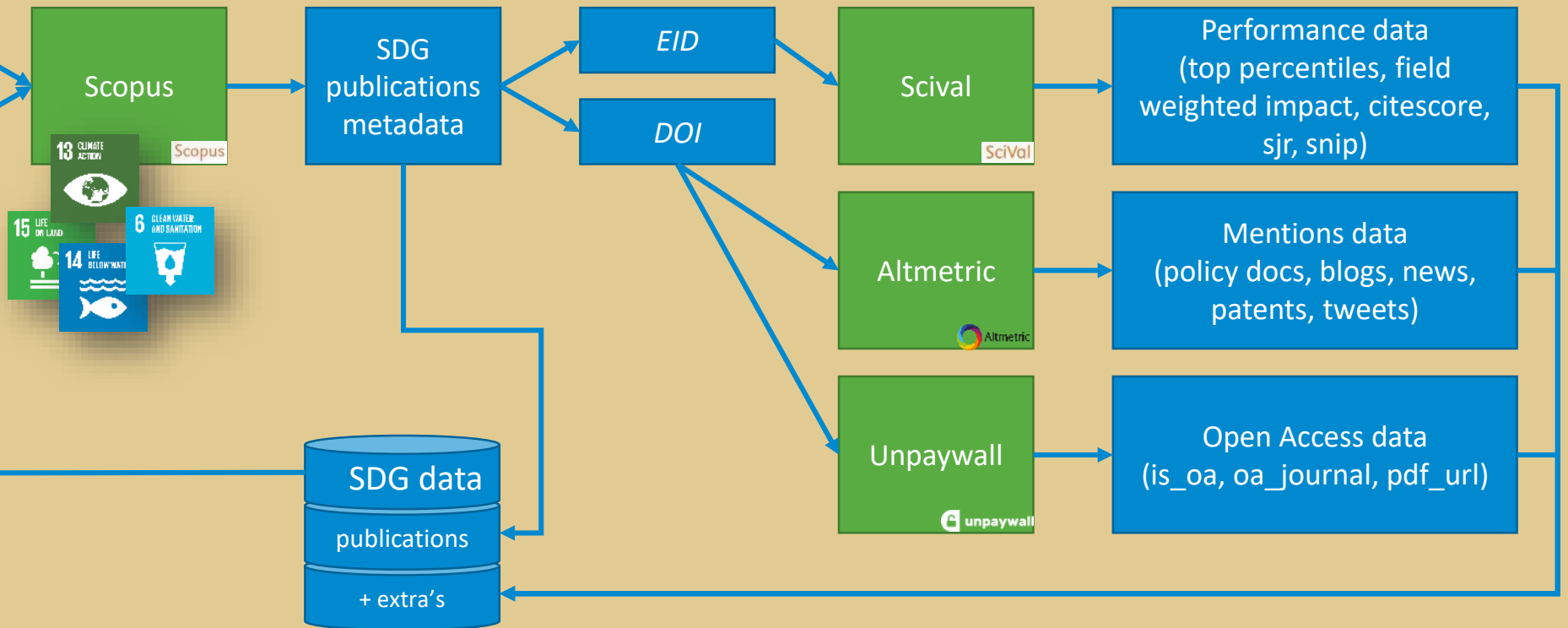
Affiliation IDs /
University

Representative
Publications set
sampling

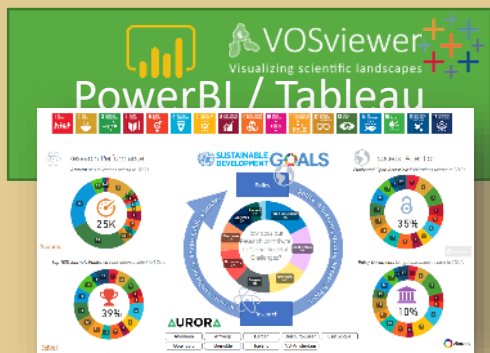
SDG query

Deep topic extraction

Data Collection



Data Visualisation



RESEARCH QUALITY: TOP 10% PERCENTILE MOST CITED JOURNALS

SciVal

Benchmarking Collaboration Reporting My SciVal Scopus [↗] Maurice Vanderfeesten

2010 to 2017 no subject area filter selected



Metrics details

- y-axis: **Collaboration (International, %)**
Types of publications included: all. Field-weighted: no
- x-axis: **Publications in Top 10 Journal Percentiles (In top 10% of Scopus Sources, %)**
CiteScore Percentile (from 2011 onwards - [Learn more](#))
Types of publications included: all.
The percentage of the Publications in Top Journal Percentiles is calculated using only the publications that have a CiteScore Percentile, SNIP, or SJR value.
- Bubble size: **Scholarly Output**
Types of publications included: all.

Top 10% Journals Published Publications related to SDG's



SOCIETAL ATTENTION: AURORA SDG PAPERS WITH REFERENCES FROM POLICY DOCUMENTS



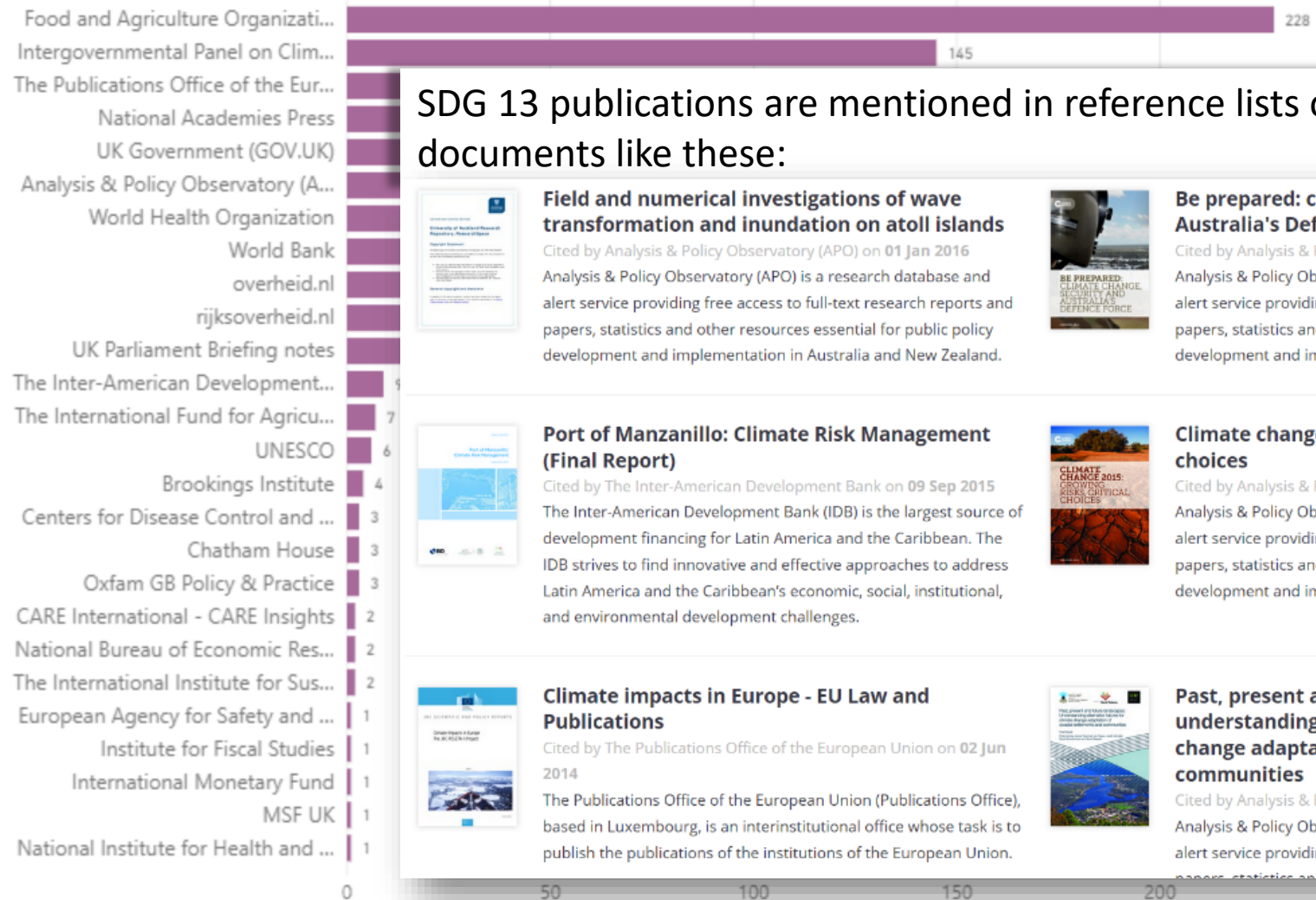
DETAIL ON POLICY SOURCES: SDG13 PUBLICATIONS REFERRED TO BY POLICY DOCUMENTS



- Mention Type
- Blog post
 - News story
 - Policy document
 - Tweet
 - Video



Number of Policy documents mentioning Climate action publications



SDG 13 publications are mentioned in reference lists of Policy documents like these:



Field and numerical investigations of wave transformation and inundation on atoll islands

Cited by Analysis & Policy Observatory (APO) on 01 Jan 2016
 Analysis & Policy Observatory (APO) is a research database and alert service providing free access to full-text research reports and papers, statistics and other resources essential for public policy development and implementation in Australia and New Zealand.



Be prepared: climate change, security and Australia's Defence Force

Cited by Analysis & Policy Observatory (APO) on 18 Sep 2015
 Analysis & Policy Observatory (APO) is a research database and alert service providing free access to full-text research reports and papers, statistics and other resources essential for public policy development and implementation in Australia and New Zealand.



Port of Manzanillo: Climate Risk Management (Final Report)

Cited by The Inter-American Development Bank on 09 Sep 2015
 The Inter-American Development Bank (IDB) is the largest source of development financing for Latin America and the Caribbean. The IDB strives to find innovative and effective approaches to address Latin America and the Caribbean's economic, social, institutional, and environmental development challenges.



Climate change 2015: growing risks, critical choices

Cited by Analysis & Policy Observatory (APO) on 24 Aug 2015
 Analysis & Policy Observatory (APO) is a research database and alert service providing free access to full-text research reports and papers, statistics and other resources essential for public policy development and implementation in Australia and New Zealand.



Climate impacts in Europe - EU Law and Publications

Cited by The Publications Office of the European Union on 02 Jun 2014
 The Publications Office of the European Union (Publications Office), based in Luxembourg, is an interinstitutional office whose task is to publish the publications of the institutions of the European Union.



Past, present and future landscapes: understanding alternative futures for climate change adaptation of coastal settlements and communities

Cited by Analysis & Policy Observatory (APO) on 04 Feb 2013
 Analysis & Policy Observatory (APO) is a research database and alert service providing free access to full-text research reports and papers, statistics and other resources essential for public policy development and implementation in Australia and New Zealand.

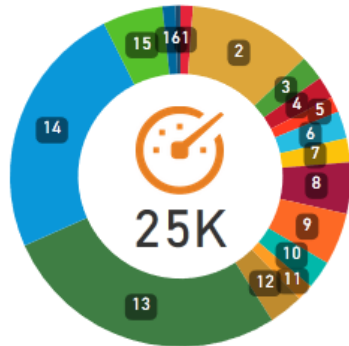
50 100 150 200

MULTIPLE DIMENSIONS ON AURORA'S SDG RESEARCH; EXCELLENCE OF THAT RESEARCH, BUT ALSO ITS REACH IN SOCIETY



Research Performance

Amount of publications related to SDG's

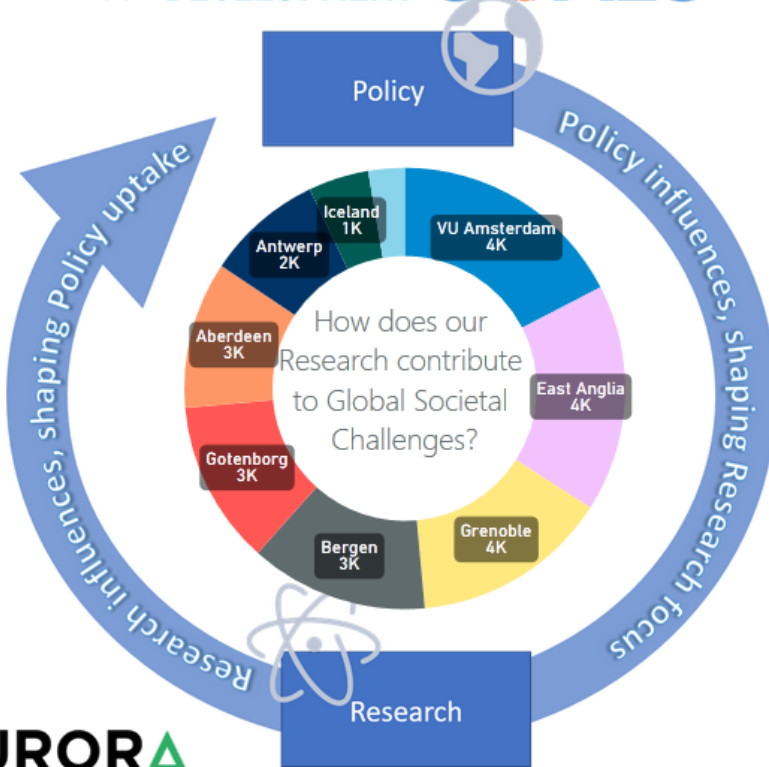


Scopus

Top 10% Journals Published Publications related to SDG's



SciVal



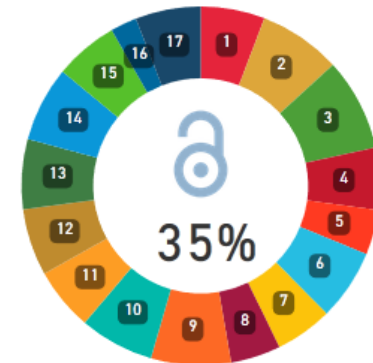
AURORA

- Aberdeen
- Antwerp
- Bergen
- Duisburg-Essen
- East Anglia
- Gotenborg
- Grenoble
- Iceland
- VU Amsterdam



Societal Attention

Freely and Open Accessible Publications related to SDG's



Policy Documents Using Publications related to SDG's



Altmetric



IF YOU WANT TO JOIN A LIVE VIEW...

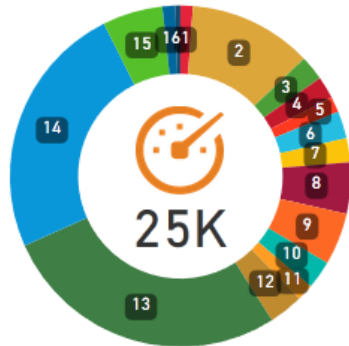


MULTIPLE DIMENSIONS ON AURORA'S SDG RESEARCH; EXCELLENCE OF THAT RESEARCH, BUT ALSO ITS REACH IN SOCIETY



Research Performance

Amount of publications related to SDG's

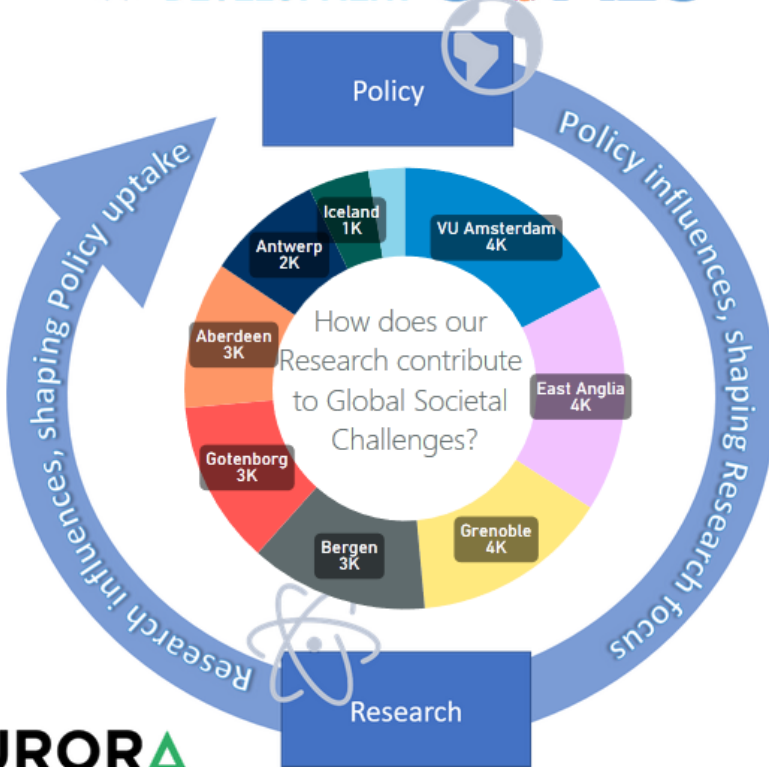


Scopus

Top 10% Journals Published Publications related to SDG's



SciVal



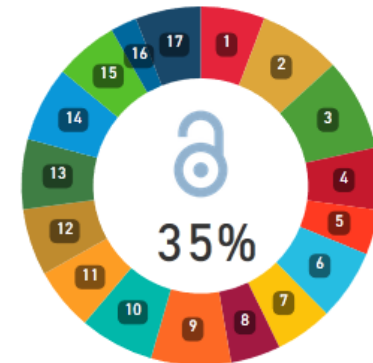
AURORA

- Aberdeen
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- Bergen
- Duisburg-Essen
- East Anglia
- Gotenborg
- Grenoble
- Iceland
- VU Amsterdam



Societal Attention

Freely and Open Accessible Publications related to SDG's



unpaywall

Policy Documents Using Publications related to SDG's



Altmetric



Choose your SDG...



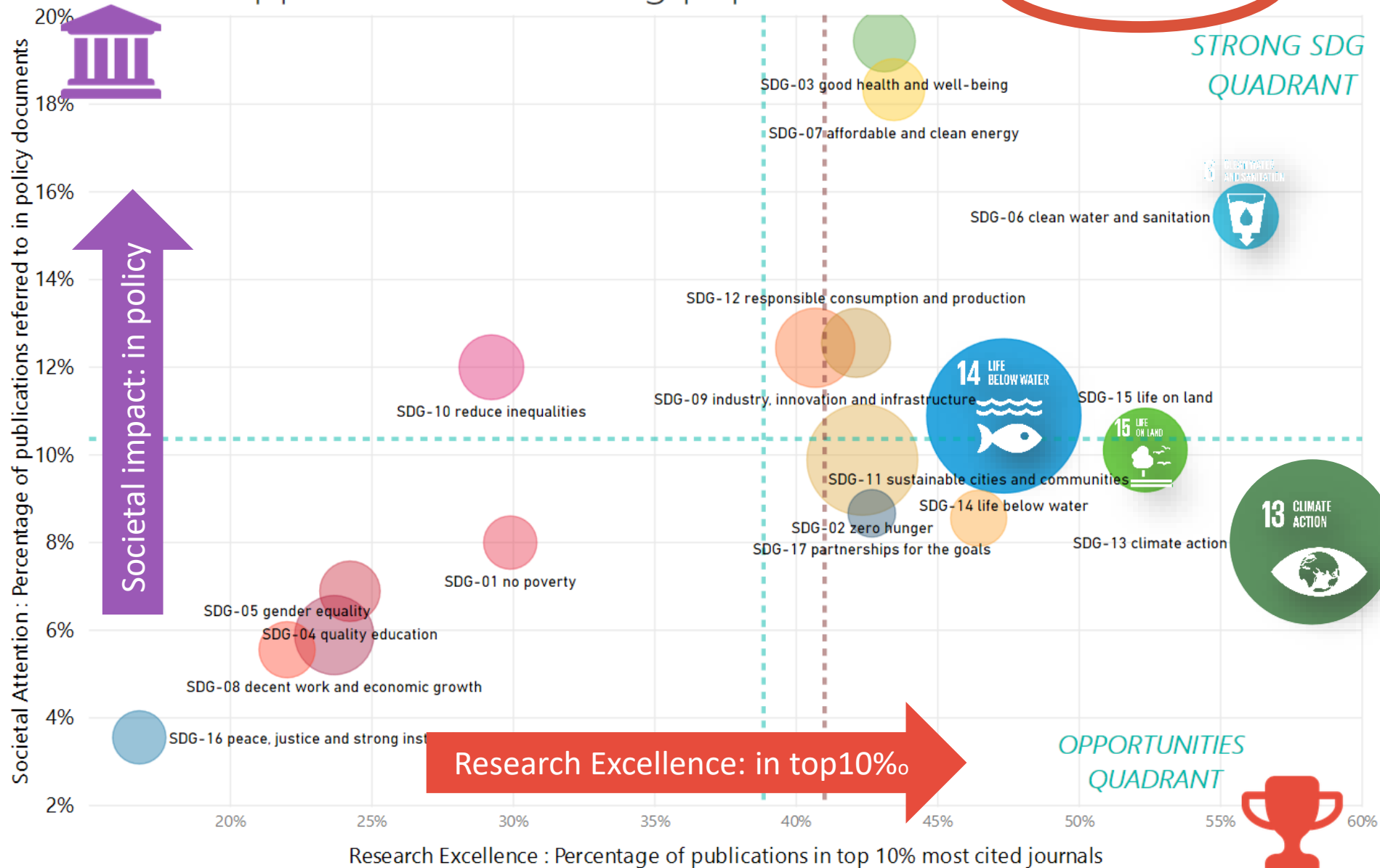
17 PARTNERSHIPS FOR THE GOALS

Minimim/maximum of pap...

...or your university. **AURORA**

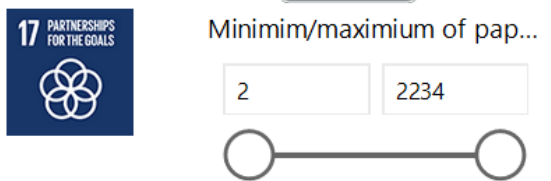
- Aberdeen
- Antwerp
- Bergen
- Duisburg-Essen
- East Anglia
- Gotenborg
- Grenoble
- Iceland
- VU Amsterdam

Opportunities & Strong papers on SDG's - SDG Level



Explainer: Mint dash lines represent the average score in the visual axis. Red dashline on average 41% of all Aurora publications (also non-SDG-related) appear in the Top10% percentile of most cited journals. The Top Right Quadrant show the SDG publications that appear the most in Top 10% percentile of most cited journals, and have the most mentions in policy documents.

Choose your SDG...



...or your university. **AURORA**

- Aberdeen
- Antwerp
- Bergen
- Duisburg-Essen
- East Anglia
- Gotenborg
- Grenoble
- Iceland
- VU Amsterdam

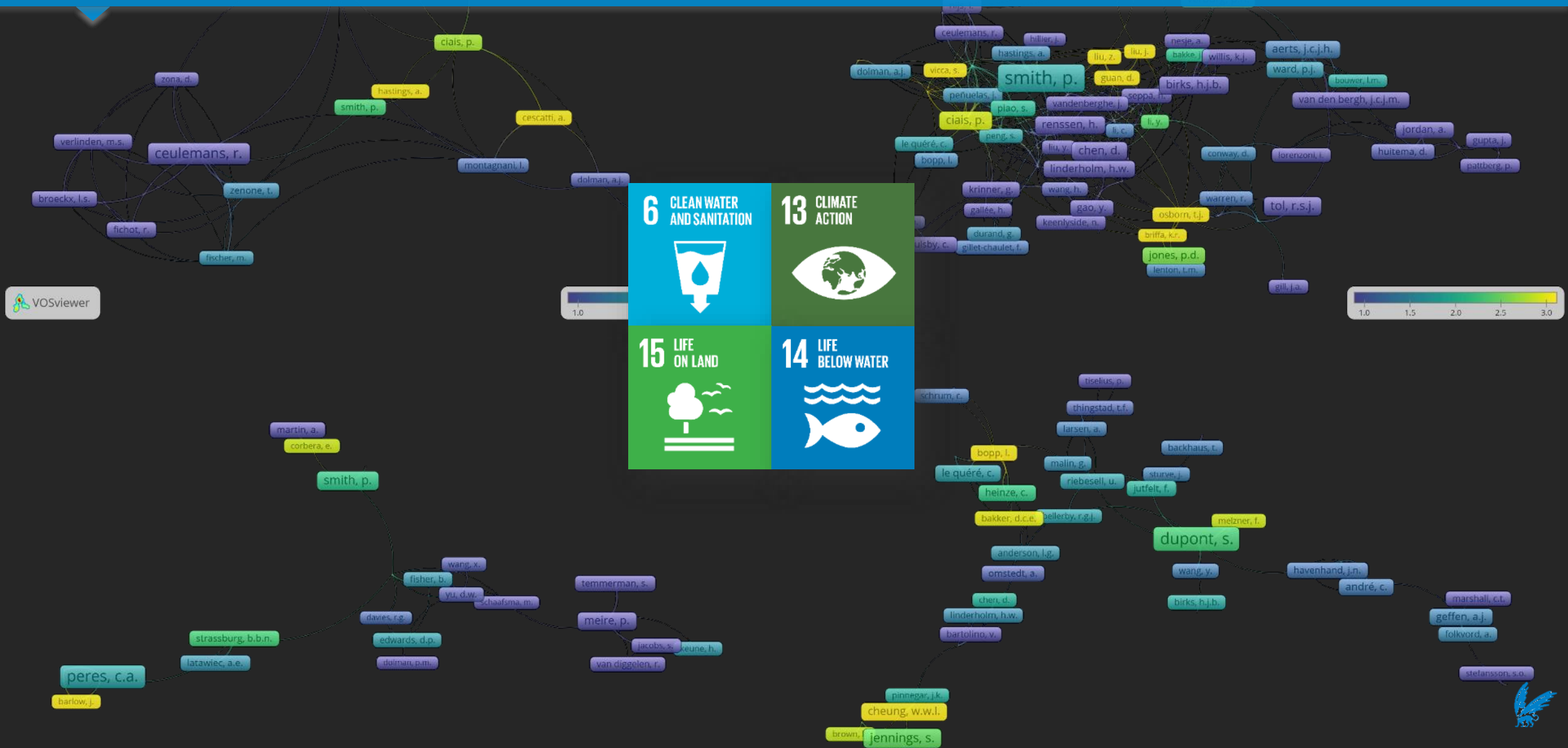
Opportunities & Strong papers on SDG's - Institutional Level



Explainer: Mint dash lines represent the average score in the visual axis. Red dashline on average 41% of all Aurora publications (also non-SDG-related) appear in the Top10% percentile of most cited journals. The Top Right Quadrant show the SDG publications that appear the most in Top 10% percentile of most cited journals, and have the most mentions in policy documents.

MOST PROMINENT (CO-)AUTHORS IN AURORA RESEARCH ON BIOSPHERE SDG'S

[SIZE: #PUBLICATIONS / AUTHOR] [CONNECTIONS: CO-AUTHORSHIP] [COLOR: NORMALIZED CITATIONS: 1=AVG]



CUSTOM TOOLING AND ALTERNATIVE METHODS FOR SPEEDING-UP THE VALIDATION OF DATA QUALITY AND DATA COLLECTION

AURORA :: SDG project

New query Continue

Affiliation IDs / University
SDG query

Scopus → Create → SDG publications metadata → EID / DOI → Scival → Performance data (top percentiles, field weighted impact, citesscore, sjr, snip)

Altmetric → Mentions data (policy docs, blogs, news, patents, tweets)

Unpaywall → Open Access data (is_oa, oa_journal, pdf_url)

SDG data publications + extra's

List of keywords

Keyword	Count
Magnetic properties	1
Copper	1
thermal properties	1
luminescence	1
ionic liquids	1
copper	1
coordination polymer	1
X-ray	1
Tritopic ligands	1
Tritopic ligand	1
Terbium	1
Supercritical CO2	1
Stacking interactions	1
Silica ionogels	1
Samarium	1
Ruthenium	1
Polyunsaturated fatty acids (PUFAs)	1
Oleaginous fungi	1
Mortierellomycolina	1
Mortierellales	1

Number of search results: 23
 Number of test entries: 4
 Number of true positives: 3
 Number of false negatives: 1
 Number of false positives: 20
 Precision: 0.13043478260869565
 Recall: 0.75

EID list Download list

Upload Scival Data

+ Choose Upload Cancel

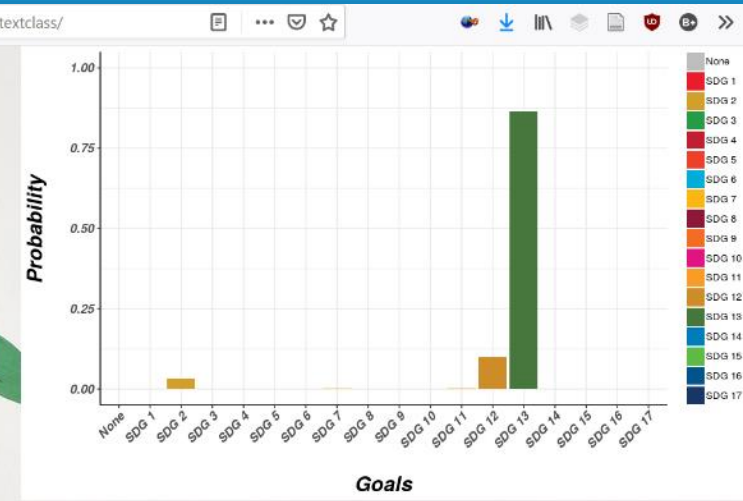
Home
File upload
Copy text
Business solutions

Type in your text

Type in or paste the text you want to label

if the potential for carbon mitigation by :

Submit



0.03 0.1 0.87

2 ZERO HUNGER

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

13 CLIMATE ACTION

Upload test entries

+ Choose Upload Cancel

CULTURAL CHANGE – PRELIMINARY WORK



GETTING THE TOP BRASSES IN THE ROOM...

Library Live

- Podcast by the library
- Talkshow
- Interviews
- Available on Soundcloud

Topics like:

- Rethinking the academic awards system.



Netherlands Organisation
for Scientific Research



VU LIBRARY LIVE

THE EFFECT OF HAVING THAT CONVERSTATION

Library Live

- Subsequently used in lectures at the VU.



VALORISATIE

DR. JUTKA HALBERSTADT
VRIJDAG 3 MEI 2019

HUISWERK VOORAF

- Ga naar de webpagina van de 'VU Library Live talk show and podcast on the academic reward system' en lees wat daar staat ([link](#))

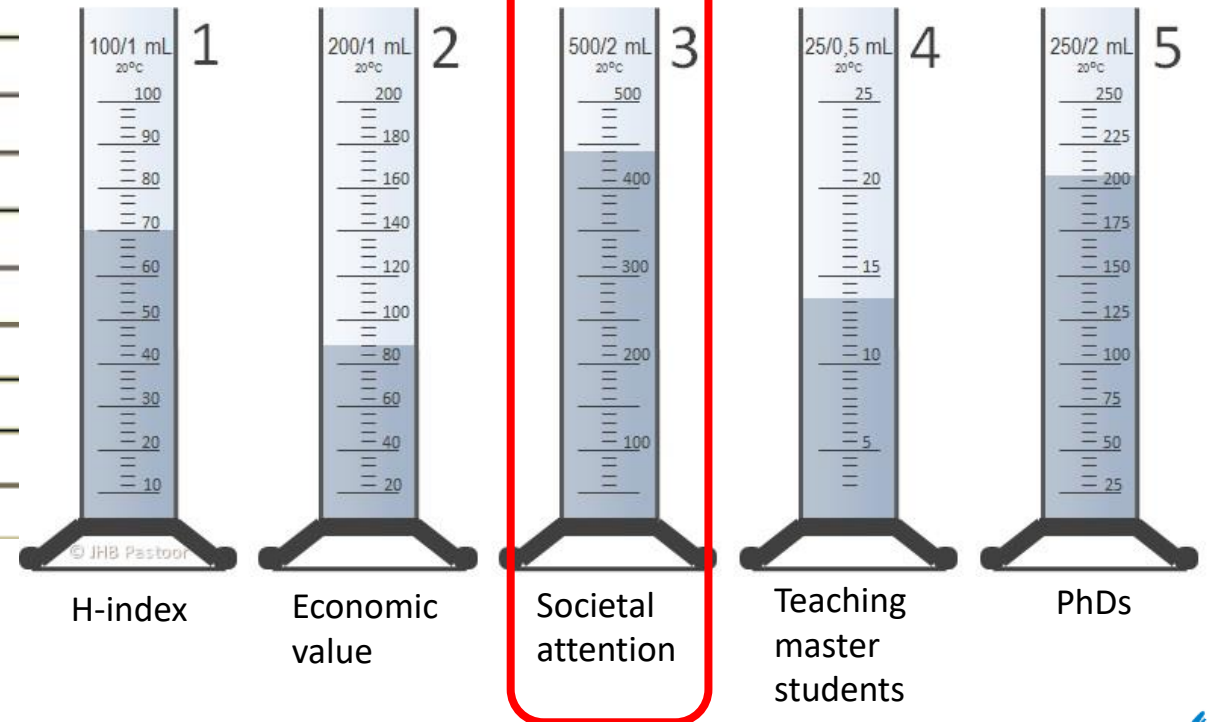
FROM CLASSICAL TO DIVERSITY

2.1 Publicaties en citaties (Toetsingscriterium: relevante wetenschappelijke publicati

- b Wetenschappelijke artikelen geïndexeerd als belangrijkste auteur
- c Wetenschappelijke artikelen geïndexeerd (totaal)
- d Wetenschappelijke artikelen peer reviewed
- e Wetenschappelijke artikelen niet peer reviewed
- f Wetenschappelijke boeken en monografieën
- g Hoofdstukken in boeken
- h Citaties als belangrijkste auteur (conform Web of Science)
- i Citaties als belangrijkste auteur (conform Google Scholar)
- j Citaties (totaal) (conform Web of Science)
- k Citaties (totaal) (conform Google Scholar)
- l Hirsch-index (conform Web of Science)
- m Hirsch-index (conform Google Scholar)
- n Hirsch-index gedeeld door het aantal jaren in onderzoek
- o Onderscheidende bijdrage aan wetenschap

4.1 Economische waarde (valorisatie)

- a Lid van adviescommissies in het commerciële domein
- b Octrooien, patenten, verkoop van intellectueel eigendom
- c Betrokkenheid bij 'spin-off' ondernemingen ('start-ups')



THANK YOU FOR YOUR ATTENTION; QUESTION TIME

