POTENTIAL ANALYSES FOR AURORA UNIVERSITY LEADERS TO STRENGTHEN COLLABORATION ON SOCIETAL CHALLENGES

Written by: Maurice Vanderfeesten (VU), René Otten (VU)
[status: final | last update: 2017-11-10]
Assigned by: Kees Kouwenaar (Aurora),
Used by: Jaap Winter (VU), Pieter van Beukering (VU)
Reviewed by: Arjan Schalken (VU), Joeri Both (VU), Mark Bruyneel (VU)
Special thanks to: Guus van den Brekel (UMCG)

doi:10.5281/zenodo.1041406

1 MANAGEMENT SUMMARY

The VU University is part of the Aurora network which seeks to promote academic and professional collaboration on societal relevant topics. The university library has been asked to investigate how the university contribution and impact on these topics through the AurorA network can be measured in such a way that the outcome can be used and translated into policy decisions. In this document we describe how bibliometric analyses can help measure the impact of university research on societal relevant topics. Using bibliometric analysis it is possible to answer questions like: How influential is our research on UN Sustainable Development Goals or EU Societal challenges? What are the potential (non-)academic collaboration partners, within and outside our institution? Which authors in the Aurora network are key nodes on societal topics? (and what are the risks on topic-expertise if this author drops out?) How effective have we been when trying to impact policy decisions with our research?

The illustration below shows that research funding on societal relevant topics has shaped the publication production of a university. The excellence of that research production is shaped by the references to these publications by their academic peers. By also making research output available to other partners in society (Open Access) we see that the research production is also shaping the impact to society, that goes the research community. It ensures that fact based policy making is made possible. Policy makers, having access to more scientific outcomes, are now able to further refine their policies on those topics. The framework for this feedback loop between research and society has been modeled in the Dutch Standard Evaluation Protocol.

VSNU Standard Evaluation Protocol (SEP)		
	Research quality	Societal relevance
Production		
Use		

doi:10.5281/zenodo.1041406

1.1 SUSTAINABLE DEVELOPMENT GOALS: INSTITUTIONAL PROFILE

To illustrate how we can measure the impact of the VU university research using bibliometric analysis we use an example from a real use case at the VU which Professor Pieter van de Beukering has provided. Due to limited time, we have prioritized our activities to a limited set of topics. We think that the example illustrates effectively what the potential of this research analytics service is, as an instrument to determine university research policy.

The colorful table below shows an example of how the feedback-loop between policy and research might look like in numbers. These numbers are backed with data and can be used for a qualitative narrative. Themes are bases on distinctive keyword queries on Web of Science to create sets of publications. The selection of keywords still needs community consensus, therefore this example only gives a rough impression.

Institutional profile on Research Excellence and Societal Relevance

UN Sustainable Development Goals

VU VRIJE UNIVERSITEIT AMSTERDAM — Institutional SDG profile — 2017-10-06

SDG: Themes		SEP: Research Quality		SEP: Relevance to society		
		Production: thematic skew of publications	*Usage:* skew in top 1% most cited	*Production:* of publications in OA (2016)	*Usage:* of publications in (N)GO Policy	*Usage:* of most cited in (N)GO Policy
2	Zero Hunger	179%	480%	44%	17%	56%
3	Good Health and Well Being	110%	81%	41%	12%	50%
11	Sustainable cities and communities	169%	292%	50%	17%	29%
12	Responsible consumption and production	147%	233%	26%	14%	133%
13	Climate Action	308%	462%	42%	20%	129%
15	Life on Land	193%	1194%	56%	19%	38%
17	Partnerships for the goals	235%	223%	42%	12%	0%
	Averages	**192%**	**424%**	**43%**	**16%**	**62%**

doi:10.5281/zenodo.1041406

Notes: The table above show an example of the SDG profile of the VU. [Data available]

- The analysis shows that in terms of number of publications, we have a particularly strong focus in goal 13 – climate action (in which the VU publishes 3.1 times more than the VU publishes on all topics in general) and goal 17 – partnerships for the goals (2.4 times more). When focusing on the 1% most cited papers in each goal, the VU performs even better with very high scores for goal 2 – zero hunger (4.8 times more (than 1% of the number of publications for that goal)) and goal 15 – Life on land (11 times more, but note that it has a very small sample size, that might explain the big number.)
- 16% of the VU papers are cited in policy documents. The most highly cited papers are even more likely to be picked up by policy makers (62%). [climate action and responsible consumption]
- On average 43% of SDG papers from 2016 are accessible for all citizens and are not just available to the research community. This includes papers from open access journals and hybrid journals. For VU and VUmc together this average is 44% in 2016.

1.2 EU – SOCIETAL CHALLENGES : NETWORK PROFILE

In the tables below we provide an example on the research performance of each of the Aurora institutions and the Aurora network as a whole on four of the seven Societal Challenges the European Commission has formulated.

EU Societal Challenges - Research profile of Aurora institutions

last update: 2017-10-10

SC Themes

European Commission

SC 2 Food security

AurorA institution	SEP: Research Quality – *Production:* thematic skew of publications	SEP: Research Quality – *Usage:* skew in top 1% most cited
Vrije Universiteit Amsterdam	1.7	7.0
Université Grenoble-Alpes	1.0	2.0
University of Aberdeen	2.7	6.8
University of Antwerp	0.1	25.0
University of Bergen	1.1	2.8
University of Duisburg-Essen	0.5	2.9
University of East Anglia	5.5	6.2
University of Gothenburg	1.3	2.0
University of Iceland	2.0	1.7
All AURORA universities	*1.7*	*4.5*

doi:10.5281/zenodo.1041406

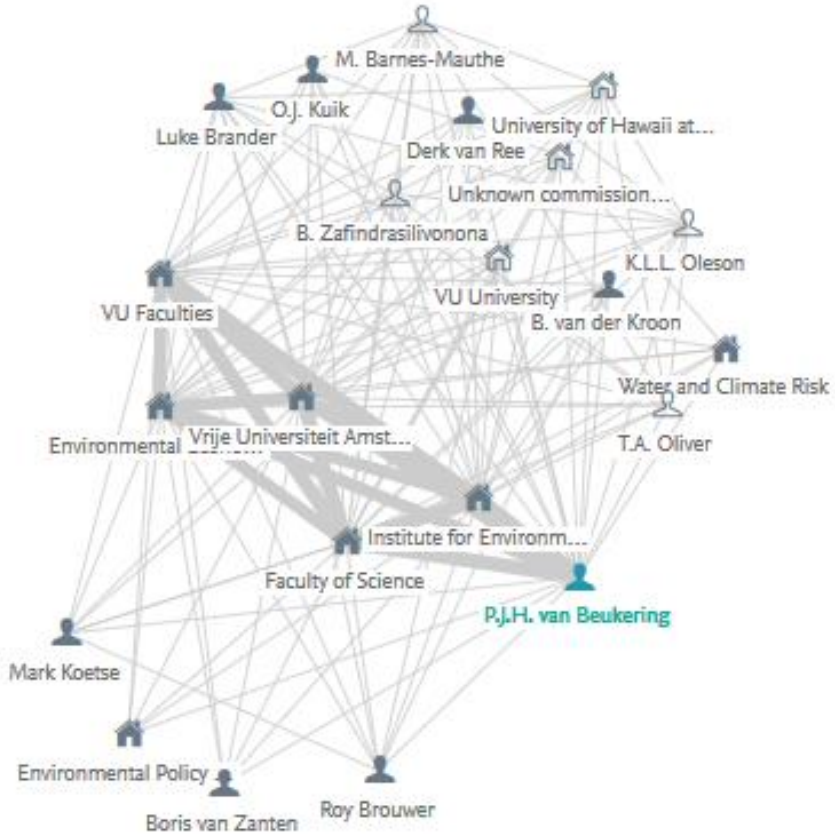
SC 3 Energy	Vrije Universiteit Amsterdam	1.1	1.9
	Université Grenoble-Alpes	1.7	3.3
	University of Aberdeen	1.4	4.1
	University of Antwerp	1.4	2.5
	University of Bergen	0.8	2.0
	University of Duisburg-Essen	0.7	1.1
	University of East Anglia	2.0	5.9
	University of Gothenburg	0.9	1.9
	University of Iceland	2.0	2.4
	All AURORA universities	*1.2*	*2.9*

SC 4 Transport and Mobili	Vrije Universiteit Amsterdam	1.4	2.4
	Université Grenoble-Alpes	2.2	2.7
	University of Aberdeen	1.7	2.3
	University of Antwerp	1.5	4.4
	University of Bergen	1.3	0.0
	University of Duisburg-Essen	2.0	0.5
	University of East Anglia	2.1	2.3
	University of Gothenburg	1.4	1.1
	University of Iceland	1.7	0.0
	All AURORA universities	*1.7*	*1.8*

SC 5 Climate Action	Vrije Universiteit Amsterdam	2.8	5.2
	Université Grenoble-Alpes	2.2	8.5
	University of Aberdeen	3.2	5.5
	University of Antwerp	2.0	5.6
	University of Bergen	3.7	4.0
	University of Duisburg-Essen	0.4	2.7
	University of East Anglia	8.0	7.5
	University of Gothenburg	2.1	4.2
	University of Iceland	4.9	2.0
	All AURORA universities	*2.8*	*5.3*

Notes: The tables illustrates that the Aurora network as a whole produces more publications on these themes than the world wide average. For example: on the theme Climate action the partners in the Aurora network produce 2.8 times more publications when compared to the overall production worldwide. The table also shows that there are 5.3 times more publications of the partners in the Aurora network in the top 1% of the most cited papers on climate action. Within the Aurora network there is also more collaboration between partners on different topics. [Data available]

doi:10.5281/zenodo.1041406



As a next step bibliometric analysis can be used to see which key partners already collaborate on societal topics and if there is potential for new collaborations, strengthening new interdisciplinary research.

doi:10.5281/zenodo.1041406

2 TABLE OF CONTENTS

doi:10.5281/zenodo.1041406

doi:10.5281/zenodo.1041406

3 WHY DOES AURORA EXIST?

At www.aurora-network.global we find the mission statement of the AurorA-network:
United by our commitment to build a different kind of inclusive university community … AurorA institutions are committed to working together to find solutions to globally relevant problems, in areas such as sustainability, climate and energy, digital technology and human life and health."

With the lens of a bibliometrician, we interpret this as follows: All partners work together on different "global-relevant-problem-areas". Research output is produced that is relevant for each "global-relevant-problem-area". Excellence of that research in each global-relevant-problem-area might differ from one partner to another. To share knowledge and make co-operation possible so that the aurora network excels as a whole, the aurora partners want to identify the stronger and weaker partners in order to help each other and create that inclusive community.

4 HOW DOES AURORA WANT TO ENGAGE TO FULFILL THIS MISSION?

"To provide mutual learning, for the most effective co-operation. Academic colleagues and Faculty leaders will work together - and so will colleagues from professional departments, engaging each of our institutions fully in our collaboration. … We will work together to influence policy in globally significant areas where we are world leading."

With the lens of a bibliometrician, we make the distinction between 1. effective-collaboration and 2. policy influence. 1. From (Mayrose & Freilich, 2015) we learn that inter-institutional co-authorship leads to higher quality research, due to the social accessibility. In order to work together and setup effective co-operation for each global-relevant-problem-area, there is a need to be able to find the most influential researcher in each partner organisation. 2. To measure the influence on policy, the research papers of aurora partners for the global-relevant-problem-area needs to be visible as references in public policy documents.

5 WHERE DOES THIS FIT IN THE VSNU STANDARD EVALUATION PROTOCOL?

Standard Evaluation Protocol 2015 (SEP) developed by VSNU, KNAW and NWO in the Netherlands to evaluate the scientific endeavour more holistically. The SEP looks at both research quality and impact on society from the perspectives of a) demonstrable products, b) use of such products, and c) recognition/acknowledgement of the research products.

	Research quality (I)	Relevance to society (II)
Demonstrable products (a)	Research products for peers Publications skew towards topics of Societal Challenges	Research products for societal target groups

doi:10.5281/zenodo.1041406

	and Sustainable development goals 	Open Science: Open Access on papers and FAIR finable data: influence on society. 
Use of products (b)	Use of research products by peers Excellence: top 1% most cited, key players, & cooperation in global challenge areas 	Use of research products by societal groups Altmetrics: influence on policy papers in global challenge areas 
Recognition (c)	Marks of recognition from peers -	Marks of recognition by societal groups -

Within AurorA reports on SIRR, SEP is recognized as a useful model to be used in scaffolding the Aurora Catalogue of Societal Impact (ACASI), where the *Use of research products by societal groups* showcased.

With the bibliometric lens; the research quality defines the areas of excellence, the "global-relevant-problem-areas" are a filter on the relevance to society, and the policy influences are the use of research products by societal groups.

6 WHAT IS THE LIBRARY GOING TO DO?

The first question is: how to define a “global-relevant-problem-area”? When we have that, we can provide for each global-relevant-problem-area, a list of universities and research units that are active in this area, and which university/faculty/department has the lead on that area. With this information university leaders can stimulate academic staff for further engagement.

The library can provide bibliometric analyses on interrelated themes:

- Define global-relevant-problem areas
    - Define collection of publications representing each area
- Research quality of research related to global-relevant-problem-areas
    - On each global-relevant-problem area:
        - Define collection of publications representing each area within each Aurora partner
        - Determine the production skew and the top 1% percentile papers of those papers

doi:10.5281/zenodo.1041406

        - Determine key authors
        - Determine current co-authorship
        - Determine potential co-authorship
- Societal relevance of research on global-relevant-problem-areas
    - On each collection of publications in a global-relevant-problem area:
        - Determine relevant show cases from Aurora Catalogue of Societal Impact (ACASI)
        - Determine the Open Access ratio
        - Determine the Policy influence of publications
        - Determine the what authors/groups influence Policy most
        - Determine the journal titels policy makers read

Please note that the information below are for illustration purposes. The library only can offer these analysis with access to research intelligence tools like SciVal, Altmetric and the future ACASI catalogue. Within the AurorA network only Duisburg has a SciVal license, none currently have an Altmetric license. (see survey results)

doi:10.5281/zenodo.1041406

7 DEFINE GLOBAL-RELEVANT-PROBLEM-AREAS

We first need to define that these areas are. We can to this by looking outside-in. What global and international organisations set goals or challenges, and what are those goals and challenges this representative society wants to gain or solve?

7.1 EU: 7 SOCIETAL CHALLENGES IN EUROPE

To see what is relevant in the world we look at the financial structure of research. Particularly external funds shape the relevance of topics that society demands further investigation. Since AurorA is a European network, the EU is an influential funding body that shapes the relevance of topics, which can be found here https://ec.europa.eu/programmes/horizon2020/en/h2020-section/societal-challenges .

1. Health, demographic change and wellbeing;
2. Food security, sustainable agriculture and forestry, marine and maritime and inland water research, and the Bioeconomy;
3. Secure, clean and efficient energy;
4. Smart, green and integrated transport;
5. Climate action, environment, resource efficiency and raw materials;
6. Europe in a changing world - inclusive, innovative and reflective societies;
7. Secure societies – Protecting freedom and security of Europe and its citizens.

doi:10.5281/zenodo.1041406

7.2 UN: 17 SUSTAINABLE DEVELOPMENT GOALS (SDGS)

Other important areas of global challenges are formulated by the united nations, in the Sustainable Development Goals. These topics can be found here https://sustainabledevelopment.un.org/sdgs

Goal 1. End poverty in all its forms everywhere
Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture
Goal 3. Ensure healthy lives and promote well-being for all at all ages
Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
Goal 5. Achieve gender equality and empower all women and girls
Goal 6. Ensure availability and sustainable management of water and sanitation for all
Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all
Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
Goal 10. Reduce inequality within and among countries
Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable
Goal 12. Ensure sustainable consumption and production patterns
Goal 13. Take urgent action to combat climate change and its impact
Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development
Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
Goal 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
Goal 17. Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development

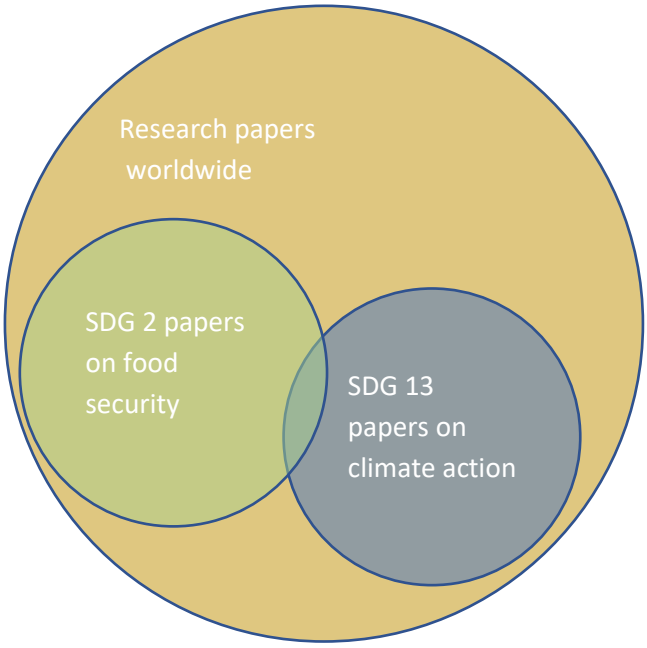
doi:10.5281/zenodo.1041406

7.3 STANDARD FOR DEFINING RESEARCH CHALLENGE AREA'S IN KEYWORDS AND SUBJECTS

Each topic can be defined with a set of keywords that can be used later in the analysis to match each AurorA institute.

We should study the subjectiveness and the effect of including or excluding keywords for each area. Also we need to come to consensus with AuroA bibliometricians. These keywords can be used in bibliometric databases like web of science or scopus for further analysis.

SDG number	SDG short name	Key words used	WoS: number of key word publications of world production	WoS: number of VU publications with key word
2	Zero Hunger	(("food" OR "nutrition") AND ("se	167761	521
3	Good Health and Well Being	("mortality" AND ("suicid*" OR "p	646487	1237
11	Sustainable cities and communities	(("inclusive" OR "safe*" OR "resil	81788	240
12	Responsible consumption and production	(("sustainab*" OR "recycl*") AND	100616	257
13	Climate Action	climat* and (change* or variabili	376944	2013
15	Life on Land	(("protect*" OR "restor*" OR "pr	20014	67
17	Partnerships for the goals	(("sustainab*") AND ("govern*" O	43912	179
		Averages		



doi:10.5281/zenodo.1041406

Keywords are chosen in a way it clusters the papers with a minimum of overlap.

For example SDG 13 papers on climate change are defined as

ts=climat* and (ts=change* or ts=variabilit* or ts=anthropogenic* or ts=model* or ts=strategy* or ts=policy* or ts=regime* or ts=scenario* or ts=carbon* or ts=”integrated assessment” or ts=environment* or ts=reforestati* or ts=deforestati* or ts=desertificati* or ts=”greenhouse gas”* or ts=GHG or ts=ecolog* or ts=environment* or ts=biodiversity or ts=”global change” or ts=”water stress”) or ts=climate-driven or ts=”global warming” or ts="sea level*" and (ts=change* or ts=rising)

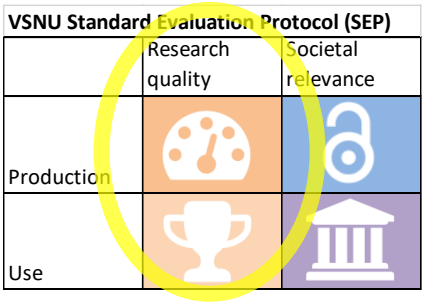
This according to (Besselaar & Sandstrom, 2013), this query has the right precision and recall to represent the in papers and journals for that topic that would be expected to appear.

doi:10.5281/zenodo.1041406

8 RESEARCH QUALITY OF RESEARCH RELATED TO GLOBAL-RELEVANT-PROBLEM-AREAS

In this section we want to show excellence within global-relevant-problem-area's.
Within the defined challenge areas, we want to see the key publications, and referring from that, key players of the AurorA universities.

Referring to the SEP2015 protocol; What follows is analogue to the left column, second row: Scientific Use of Research Output.



8.1 DEFINE COLLECTION OF PUBLICATIONS REPRESENTING EACH AREA WITHIN EACH AURORA PARTNER

With the keywords defined earlier, we can search the scopus or web of science database to find papers related to that topic. Then we limit the results for each institution.

WoS Example: **TOPIC:** ("climate change*") AND **ORGANIZATION-ENHANCED:** (Vrije Universiteit Amsterdam)

doi:10.5281/zenodo.1041406

8.2 DETERMINE THE PRODUCTION SKEW AND THE TOP 1% PERCENTILE PAPERS

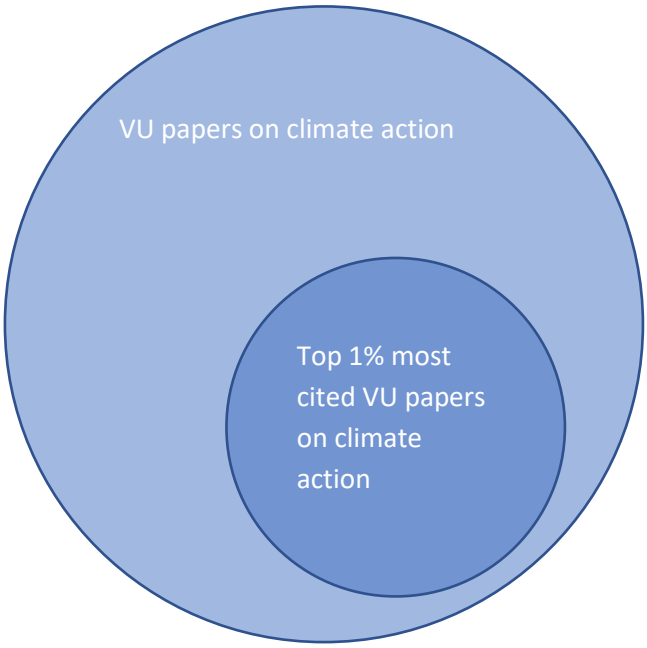
For each topic we want to determine how much VU papers are represented in the bucket of papers that are the 1% most cited papers on climate change.

For this we refine the outcome above to the highly cited papers

Refined by: ESI Top Papers: (Highly Cited in Field)

If all papers from all universities get cited equal, you would expect 1% would be in the bucket of 1% most cited papers. You will find more VU papers in hat bucket of 1% most cited papers on climate change. So we calculate the factor of papers over representing that from what is normally to expect.

The top 1% of most cited VU papers on climate change, divided by 1% of all VU papers on climate change. Results in a factor 5 more cited papers than expected.



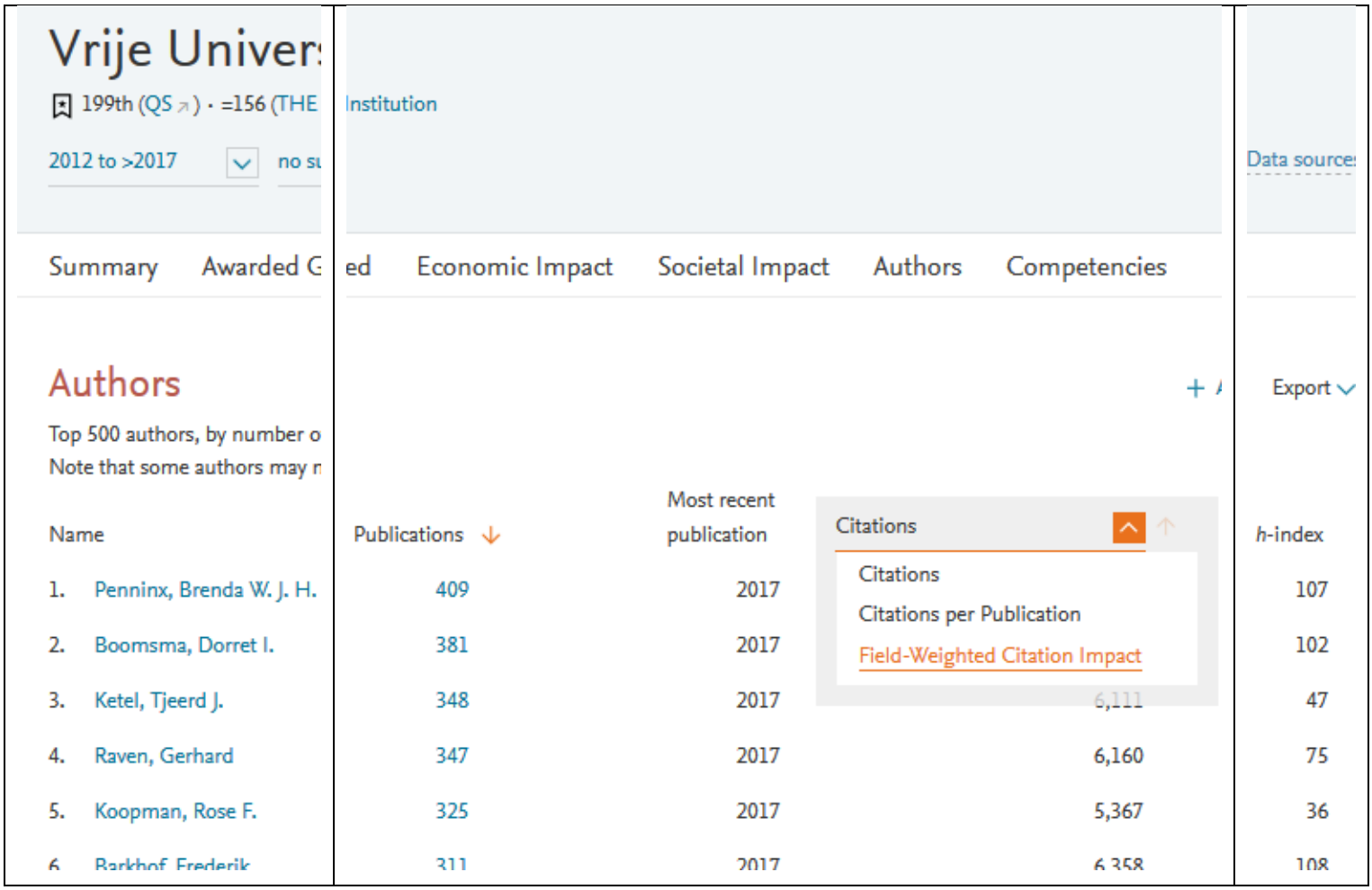
doi:10.5281/zenodo.1041406

SDG number	SDG short name	Calculated: percentage of VU SDG papers, compared to world production of SDG papers	focus within VU total production: factor VU SDG production compared to VU total producti	WoS: actual number of 1% top percentile publications of VU productior	Calculated: expected number of 1% top percentile publications of VU productio	Calculated: factor of top 1% highly cited papers actualiy produced by VU research, compared to expected 1% of VU production
2	Zero Hunger	0.31%	179%	25	5.2	480%
3	Good Health and Well Being	0.19%	110%	10	12.4	81%
11	Sustainable cities and communities	0.29%	169%	7	2.4	292%
12	Responsible consumption and production	0.26%	147%	6	2.6	233%
13	Climate Action	0.53%	308%	93	20.1	462%
15	Life on Land	0.33%	193%	8	0.7	1194%
17	Partnerships for the goals	0.41%	235%	4	1.8	223%
			192%	21.9	6.4	424%

doi:10.5281/zenodo.1041406

8.3 DETERMINE KEY AUTHORS/RESEARCHERS

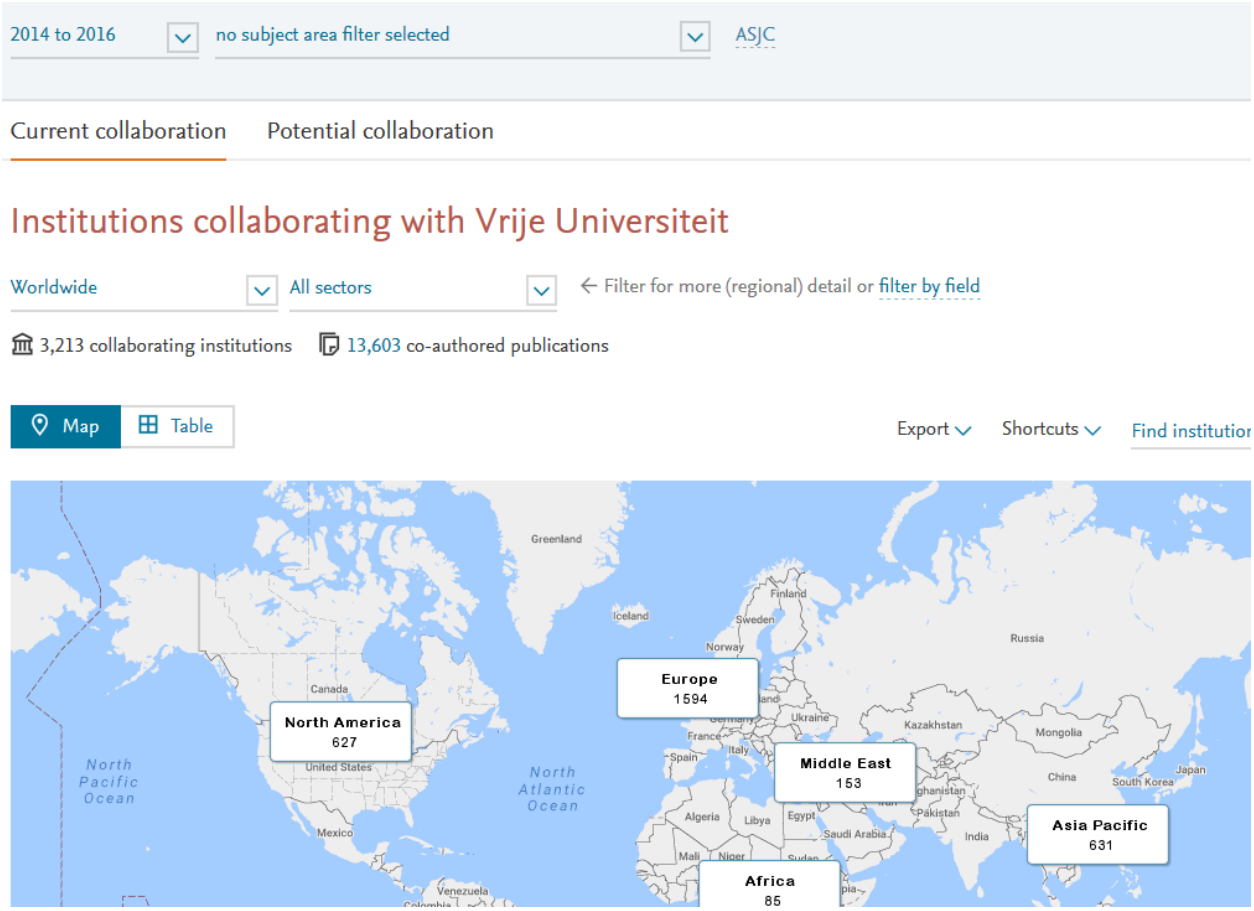
Within a publication collection we can determine the most influential authors, based on field weighted impact of their publications. Due to lack of time we have not done this analysis. However it appears that is can be done with the right tooling. The screenshot below is given as an example from a SciVal research intelligence platform, where we see the most influential researchers of the VU within a time period. Scival allows to change the period, and to focus from institution to for example a research area or a set of publications.



doi:10.5281/zenodo.1041406

8.4 DETERMINE CURRENT CO-AUTHORSHIP (WITH ACADEMIA AND INDUSTRY)

With Scival we can see the current co-authorship of publications from an institution, and hopefully in the future a custom set of publications or a research area (such as the SDG's and SC's). The co-authors can even be filtered on partners in industry and academia, but also see collaboration with a specific region, country or institution (for example the Aurora institutions). The example below shows the institutions co-publishing between 2014 to 2016 with VU authors on a map.

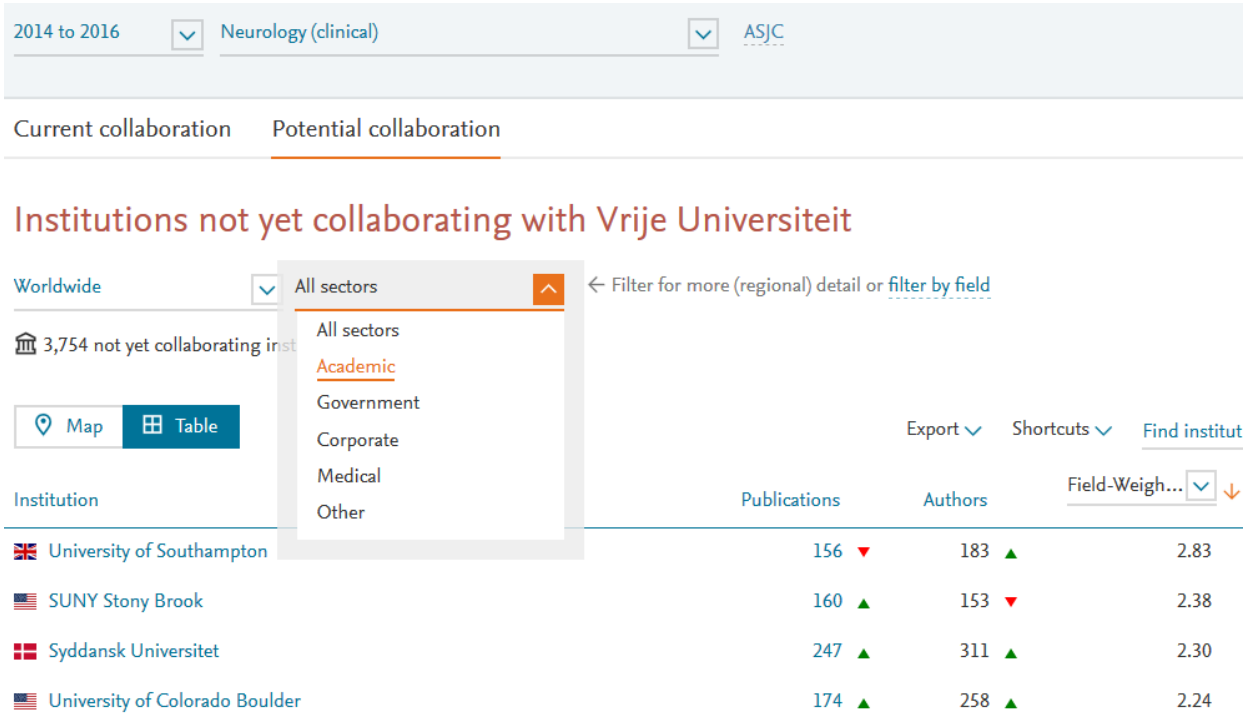


doi:10.5281/zenodo.1041406

8.5 DETERMINE POTENTIAL COLLABORATION

The example below shows the institutions that are strong on Clinical Neurology between 2012 and 2016, but where VU researchers did not have co-published with yet. Also here we can filter on sector or region.

This create opportunities for new collaborations; for example when you might want to know what industry partner to work with in Europe on Climate action.



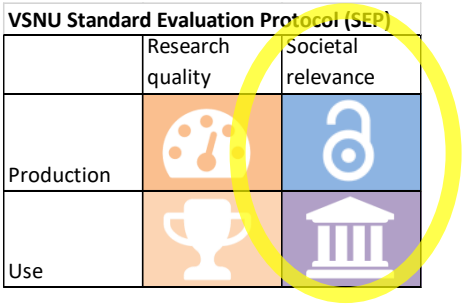
Professor Pieter van de Beukering at the VU, might even want to know what potential collaborations to setup within the VU on the different SDG topics. However, at the moment Scival does not offer this analysis at that fine resolution yet.

doi:10.5281/zenodo.1041406

9 SOCIETAL RELEVANCE OF RESEARCH ON GLOBAL-RELEVANT-PROBLEM-AREAS

In this section we want to monitor influences of research on policy within the challenge areas.

Referring to the SEP2015 protocol; What follows is analogue to the right column, second row: Societal Use of Research Output.



9.1 DETERMINE RELEVANT SHOW CASES WITH GROSS ACADEMIC VALUE (BAW) TEMPLATE IN THE AURORA CATALOGUE OF SOCIETAL IMPACT (ACASI)

With the information we now know who the key players are in each societal challenge area, we can look-up their showcases in the Aurora Catalogue of Societal Impact (ACASI)

"… we would clearly distinguish between cases of societal impact and cases of societal relevance (or potential impact), and between societal impact of research in a narrow sense and of research through education. In the terminology of the Dutch Standard Evaluation Protocol, ACASI should be about the demonstrable use of tangible scientific findings (research or education products) by society, not about the products themselves, nor about recognition awarded based on expertise or cumulative academic achievements. The case studies should describe the significance and reach of the achieved societal impact (cf. UK REF)." - Jord Hanus (University of Antwerp)

9.1.1 GROSS ACADEMIC VALUE-TEMPLATE AS SHOW-CASE TEMPLATE FOR THE AURORA CATALOGUE OF SOCIETAL IMPACT

A VU workinggroup, not related to AurorA activities, is on the same track to value societal relevance and impact. This group created a concept-template, that might be useful for scaffolding the ACASI catalogue. Open embedded pdf for more information.

… Bruto Acaden

9.1.2 BAW + SEP REGISTRATION WITH PURE

doi:10.5281/zenodo.1041406

The VU library is currently making an assessment how PURE can be used to register and report on these societal relevancy to fill the template.

Bruto Academische Waarde in Research -

9.2 DETERMINE THE OPEN ACCESS RATIO

9.2.1 DEFINE OPEN ACCESS

At the VU we declare publications to be in open access, when it appears to be in a journal listed in the directory of open access journals (DOAJ), the pdf can be downloaded on from the journal website outside the campus ip-range (hybrid journals), or from an institutional repository (green open access). This follows the VSNU rules.

9.2.2 OPEN ACCESS RATIO PER CHALLENGE AREA PER YEAR

Each year we collect a list of publications following that definition. Within one year we can match that list to the publications in the challenge area from the same year.

SDG number	SDG short name	number of publications in 2016	number of open access publications in 2016	percentage of open access publications in 2016	number of highly cited top 1% publications in 2016	number of highly cited top 1% open access publications in 2016	percentage of highly cited top 1% open access publications in 2016
2	Zero Hunger	36	16	44%	2	2	100%
3	Good Health and Well Being	80	33	41%	5	0	0%
11	Sustainable cities and communities	18	9	50%			
12	Responsible consumption and production	23	6	26%			
13	Climate Action	125	53	42%	10	7	70%
15	Life on Land	9	5	56%	1	1	100%
17	Partnerships for the goals	19	8	42%		0	
		44	19	43%	5	2	68%

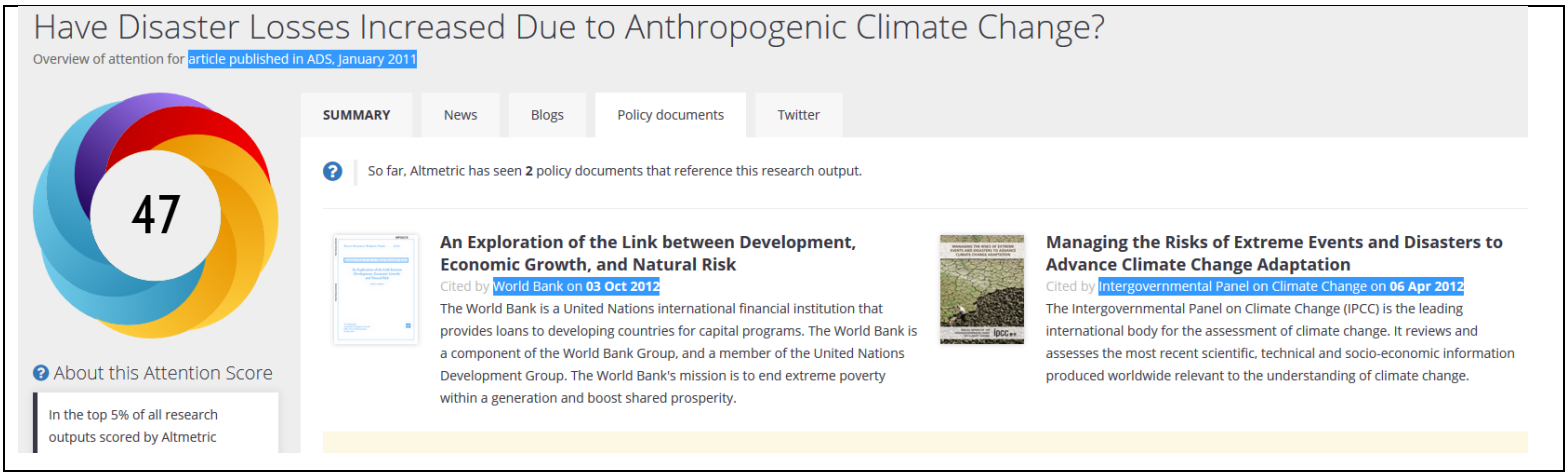
doi:10.5281/zenodo.1041406

9.3 DETERMINE THE POLICY INFLUENCE OF PUBLICATIONS

To monitor the influence on policy, we want to see if key publications within the societal challenge areas, appear in policy documents of government bodies. This can be done for each AurorA university separately, and aggregated on AurorA level.

9.3.1 POLICY DOCUMENTS REFERRING TO RESEARCH PUBLICATIONS

Below we see that a VU paper from 2011, that has been used in policy document s of the IPCC and the World bank in 2012. Altmetric is a startup that scans the publically available pdf's on the websites from governmental organisations (eg. rijksoverheid.nl, ec.europa.eu, etc.) and non-governmental organizations (ipcc.org, who.org, etc.) where it looks for markers that refer to publications.



doi:10.5281/zenodo.1041406

9.3.2 POLICY INFLUENCE OF PUBLICATIONS PER CHALLENGE AREA

We want to see, not only the influence of one paper, but the influence of the whole set of research papers from the VU or the AurorA network regarding each global-problem-area.

SDG number	SDG short name	Societal influence: policy papers refering to VU research	Calculated: Societal inluence: percentage of research papers making it into policy documents	Societal influence: policy papers refering to HighlyCited top1% VU papers	Calculated: Societal influence of Highly Cited papers: percentage of Highly Cited SDG related papers that end up in policy document
2	Zero Hunger	88	17%	14	56%
3	Good Health and Well Being	151	12%	5	50%
11	Sustainable cities and communities	40	17%	2	29%
12	Responsible consumption and production	35	14%	8	133%
13	Climate Action	411	20%	120	129%
15	Life on Land	13	19%	3	38%
17	Partnerships for the goals	22	12%	0	0%
		108.6	16%	22	62%

With the help, generosity and kindness of Guus van den Brekel at University Medical Center Groningen (UMCG), we were able to parse the publication collections through Altmetrics, where we received the public reports below.

- Altmetrics on VU publications
  - 2 Zero Hunger
  - 3 Good Health and Well Being
  - 11 Sustainable cities and communities
  - 12 Responsible consumption and production
  - 13 Climate Action
  - 15 Life on Land
  - 17 Partnerships for the goals
- Altmetrics on VU top 1% publications
  - 2 Zero Hunger
  - 3 Good Health and Well Being
  - 11 Sustainable cities and communities
  - 12 Responsible consumption and production
  - 13 Climate Action
  - 15 Life on Land
  - 17 Partnerships for the goals

doi:10.5281/zenodo.1041406

9.3.3 IMPORTANT POLICY SOURCES REFERRING TO RESEARCH

When we zoom into the papers on climate action. Here we show the policy sources referring to this research. We can see that climate action papers are mainly used by the IPCC.

Policy sources referring to VU Climate research papers

Policy sources	Policy papers refering to all VU climate research (n=2006)
Intergovernmental Panel on Climate Change	61
The Publications Office of the European Union	54
Food and Agriculture Organization of the United Nations	41
Australian Policy Online	40
National Academies Press	33
World Bank	28
rijksoverheid.nl	21
overheid.nl	11
World Health Organization	10
National Bureau of Economic Research	8
The Inter-American Development Bank	6
UK Government (GOV.UK)	6
UNESCO	3
Brookings Institute	2
The International Fund for Agricultural Development	2
UK Parliament Briefing notes	2
International Monetary Fund	1
Oxfam GB Policy & Practice	1
The International Institute for Sustainable Development	1
Totaal	**331**

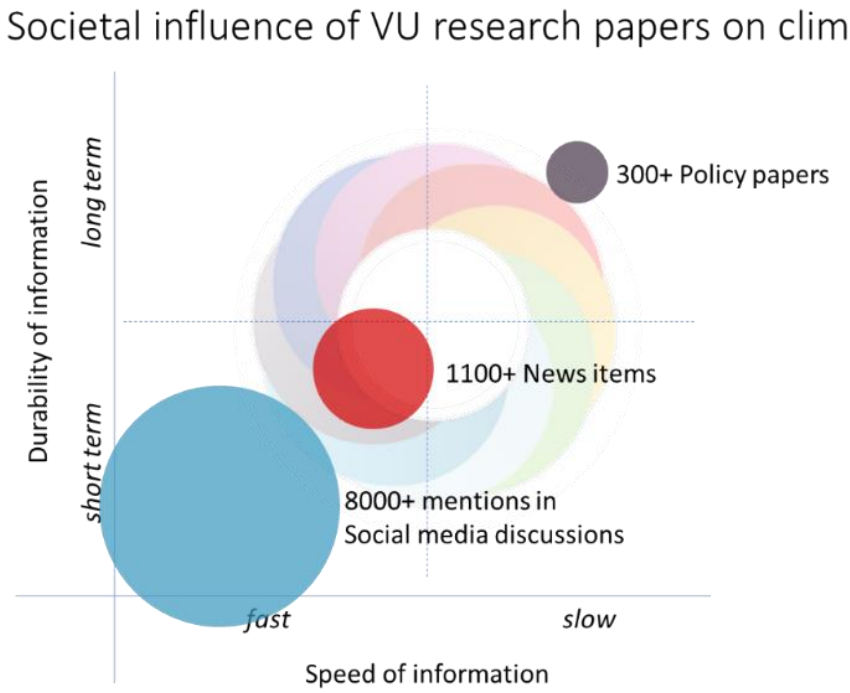
This mention-data, we also received from Guus van den Brekel at University Medical Center Groningen (UMCG), was based on 2006 publications in SDG 13 – climate action. This data contained 331 records, where mentions were filtered on policy documents.

[Data available here]

doi:10.5281/zenodo.1041406

9.4 MORE SOCIETAL INFLUENCE OF PUBLICATIONS – NEWS MEDIA, BLOGS, SOCIAL MEDIA

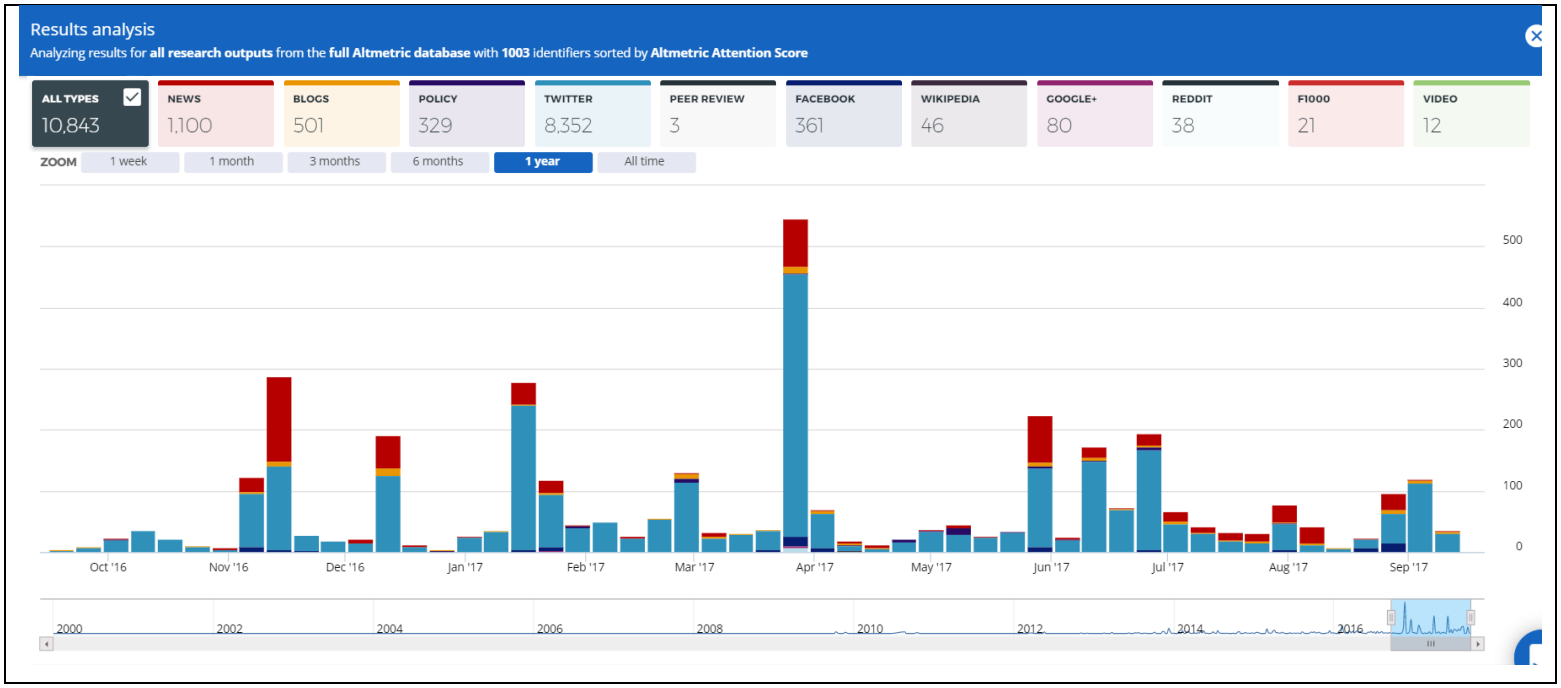
The illustration below shows 1000 publications from VU research on Climate Action is talked about in different societal contexts. We see papers are mentioned twitter where information is fluid and travels fast, but also in policy documents, where the information travels slower yet has more durable impact on society on the long run.



doi:10.5281/zenodo.1041406

9.4.1 TIMELINE: GLOBAL EVENTS REFER TO SCIENTIFIC FACTS TO COMAT FAKE NEWS

We can put this on a timeline of influence last year.



9.4.2 EXAMPLE: HURRICANE SEASON 2017 – MEDIA ACTIVITY AROUND CLIMATE ACTION PUBLICATIONS

This shows the media activity around publications in the Climate Action collection.

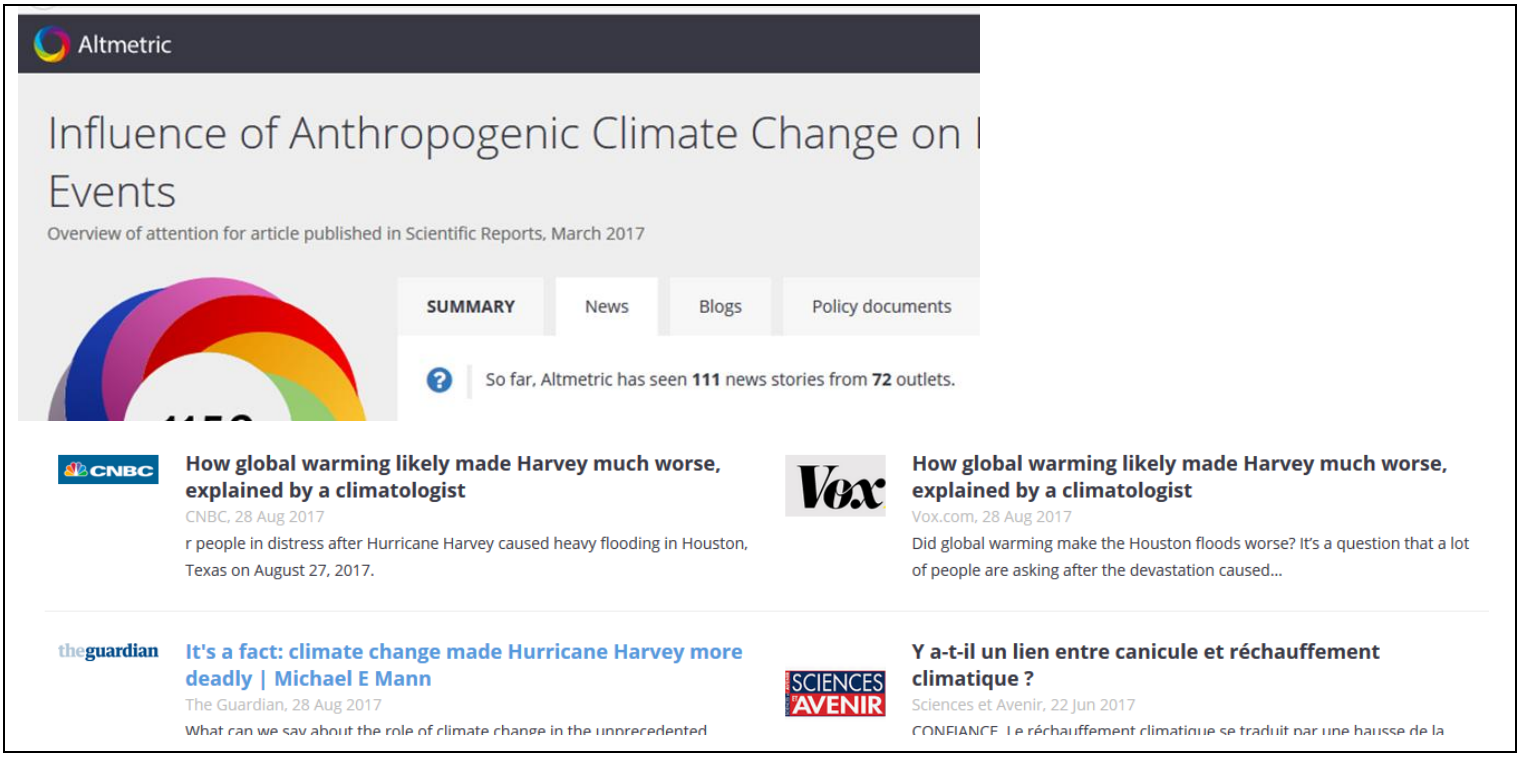
doi:10.5281/zenodo.1041406

In the timeline we picked out an example of a publication (Mann et al., 2017) that got the most media attention during the hurricane season. [link to altmetric data]

doi:10.5281/zenodo.1041406

This paper was mentioned in a short period of time in several major news outlets like the Guardian and Vox.

doi:10.5281/zenodo.1041406



9.5 SHARING SOCIETAL IMPACT STRATEGIES – DETERMINE WHAT AUTHORS/GROUPS INFLUENCE POLICY MOST

To share knowledge, you want to know within your organization who are the people or groups that influence policy the most in a Challenge area. When these researchers are identified, they could be asked to share knowledge about their strategies.

The data allows to answer these questions, due to time limitations, we have not come up with an example yet.

doi:10.5281/zenodo.1041406

9.6 SOCIETAL IMPACT IN PUBLICATION STRATEGIES – DETERMINE THE JOURNAL TITELS POLICY MAKERS READ

Using massive scale analysis we can determine what journal titles to publish in, to influence public policy.

For example policy makers at the World Health Organization commonly use references to papers from The Lancet, BMJ, NEJM, etc.

Row Labels	Count of Journal/Collection Title
The Lancet	11556
British Medical Journal	4885
New England Journal of Medicine	4760
JAMA: Journal of the American Medical Association	4094
The American Journal of Tropical Medicine and Hygiene	3319
Social Science & Medicine	2996
Journal of Infectious Diseases	2866
AIDS	2422

For other public policy organisations thise journal titels might differ. With that knowledge this information could be part of your publication strategy to optimize for societal impact, by targeting specific policy audiences. [read more in this explanatory blog post]

doi:10.5281/zenodo.1041406

10 REFERENCES

Besselaar, P. A. A. van den, & Sandstrom, U. (2013). The effects of funding modes on the quality of knowledge production. Retrieved from https://research.vu.nl/en/publications/the-effects-of-funding-modes-on-the-quality-of-knowledge-producti

Mann, M. E., Rahmstorf, S., Kornhuber, K., Steinman, B. A., Miller, S. K., & Coumou, D. (2017). Influence of Anthropogenic Climate Change on Planetary Wave Resonance and Extreme Weather Events. *Scientific Reports*, *7*, srep45242. https://doi.org/10.1038/srep45242

Mayrose, I., & Freilich, S. (2015). The Interplay between Scientific Overlap and Cooperation and the Resulting Gain in Co-Authorship Interactions. *PLOS ONE*, *10*(9), e0137856. https://doi.org/10.1371/journal.pone.0137856

doi:10.5281/zenodo.1041406