Mapping the scientific impact of European Funded SSH projects

Sándor Soós[1], Zsófia Vida[1], George Kampis[2]

[1]Hungarian Academy of Sciences (MTA), Budapest, Hungary

[2]Petabyte Research Ltd., Budapest, Hungary

Background of research

- The IMPACT-EV project (FP7)
- Dedicated task: To develop/construct a feasible indicator system for monitoring the scientific impact of European funded research projects
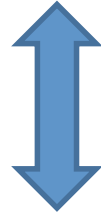

What is IMPACT-EV?

The main objective of IMPACT-EV is to develop a permanent system of selection, monitoring and evaluation of the various impacts of Social Sciences and the Humanities research. IMPACT-EV will not only develop indicators and standards for evaluating scientific impact of SSH research but especially, for evaluating their political and social impact. This project started in January 2014 and will be finished in December 2017 (48 months).

Essential tension" in SSH impact evaluation:

- Traditional bibliometric methods often deemed to be unsuitable for the majority of SSH fields. Main reason: characteristics of SSH scholarly communication (language, scope, citation culture, low database coverage).

- Policy-based demand for feasible, data-driven, informative, generally applicable, large-scale devices (= bibliometric indicators) for detecting the impact of SSH research (as well).

The basic idea

Scheme of our approach: **Impact dimensions, indicator families that**

- (1) Capture various possible aspects of project-related scientific impact (academic influence, effect),
- (2) Can be formalized in *feasible* measurements,
- (3) Can deal with underrepresented or latent impacts,
- (4) Can be applied on standard citation databases, such as the WoS (feasibility: data availability).
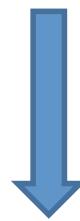
- An system of indicators being sensitive to SSH impacts in big and available data settings (bibliometric data, altmetric data).
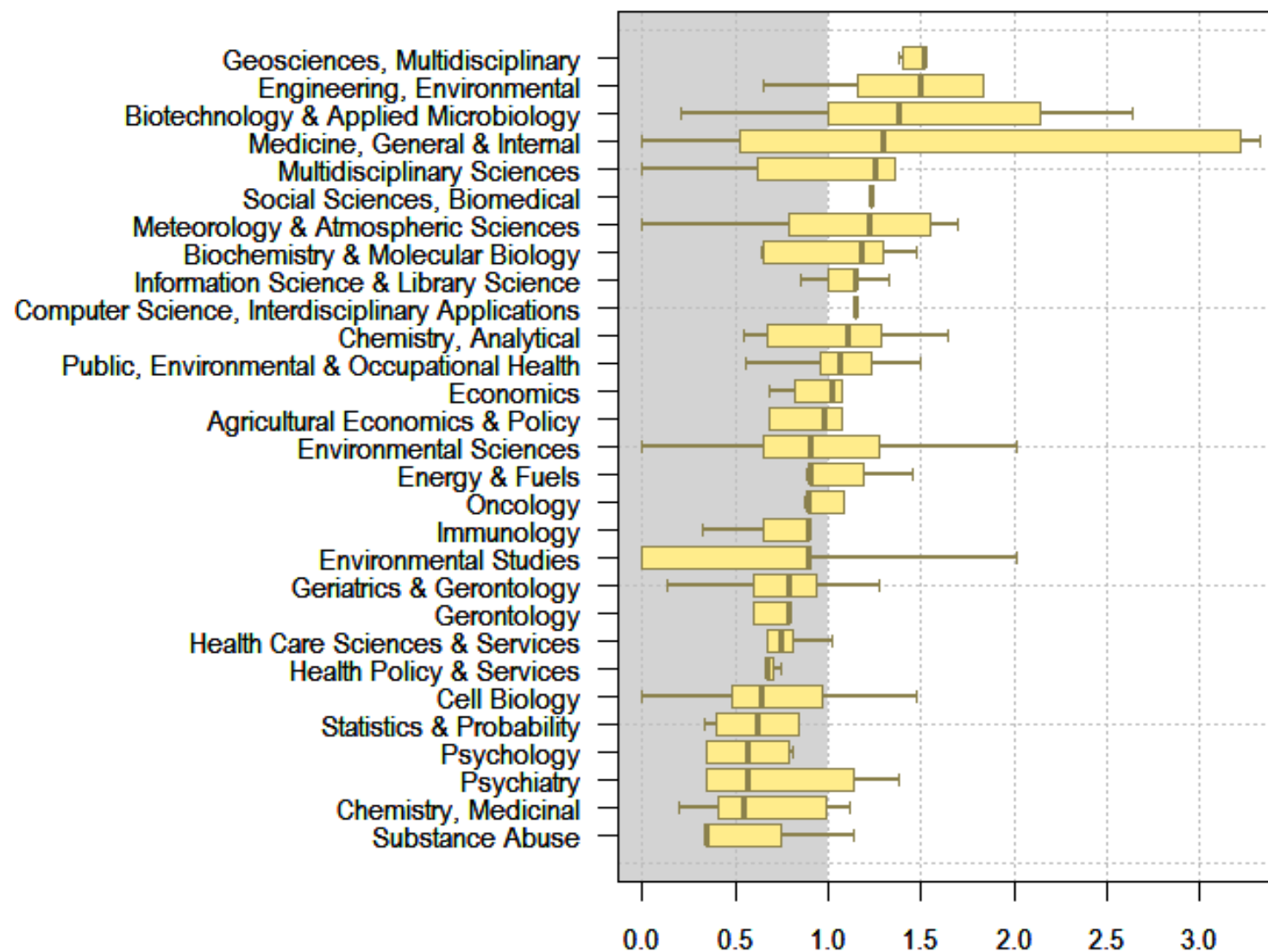
Dimension 1: citation impact
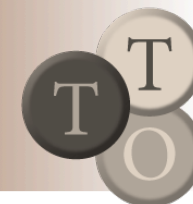
Indicator description	Abbreviation	Dimension	Primary applicability
Times cited in Web of Science	wos_times_cited	Citation impact	ex-post
Times cited in Google Scholar	gs_times_cited	Citation impact	ex-post
Times cited in RePeC	repec_times_cited	Citation impact	ex-post
Times cited in SSRN	ssrn_times_cited	Citation impact	ex-post
Mean Normalized Citation Score	mncs	Citation impact	ex-post
Normalized Citation Score Variance	vncs	Citation impact	ex-post
Maximum Normalized Citation Score	maxncs	Citation impact	ex-post

- **Normalized Citation Score Variance (vncs)**. The variance in mncs scores obtained separately for each WoS category (subject field) included in the sample.

- **Maximum Normalized Citation Score (maxncs)**. The maximal value of mncs scores obtained separately for each WoS category (subject field) included in the sample.

Indicator description	Abbreviation	Dimension	Primary applicability
Number of collaborating third party countries	g.outsiders.n	Mobilization	ex-itinere
Relative number of collaborating third party countries	outsider.rate.in.co. network	Mobilization	ex-itinere
Internal collaboration density	g.link.proj.per.pot. proj.part.link	Mobilization	ex-itinere
Activity rate	partic.rate	Mobilization	ex-itinere
Co-participation	co_participation	Mobilization	ex-itinere

- **Internal collaboration density.** The density of the co-author network of consortium members obtained from scholarly publications. Compares the collaborative potential of the consortium with the resulted actual collaboration pattern.

- **Activity rate**. The ratio between (1) the number of unique participant country affiliations in the publication output of the project, and (2) the number of participant countries. The indicator conveys the share of those project participants that are engaged in scholarly publishing attributable to the project, at the level of countries.

Dimension 3: knowledge transfer

Indicator description	Abbreviation	Dimension	Primary applicability
Field-oriented citation diversity	diffusion	Knowledge transfer	ex-post
Utility in subsequent European projects.	fp-uptake	Knowledge transfer	ex-post

- **Field-oriented citation diversity (diffusion)**. The disciplinary scope of the uptake of knowledge published in project outputs. Based on the Jaccard index, the relative overlap between the fields of the cited and citing literature. Provides the percentage share of „new" WoS Subect Categories (WCs) on the citing side. (Degree of interdisciplinarity within the citation impact of project outcomes).

- **Utility in subsequent European projects. (fp-uptake)**. The indicator traces the uptake of project outcomes in other European funded projects. Technically, for each project under study, the index counts those scholarly publications (accessible through appropriate databases) that (1) cite the documents produced by the specific project and (2) are themselves funded by some European project (according to the Acknowledgement section in the paper).

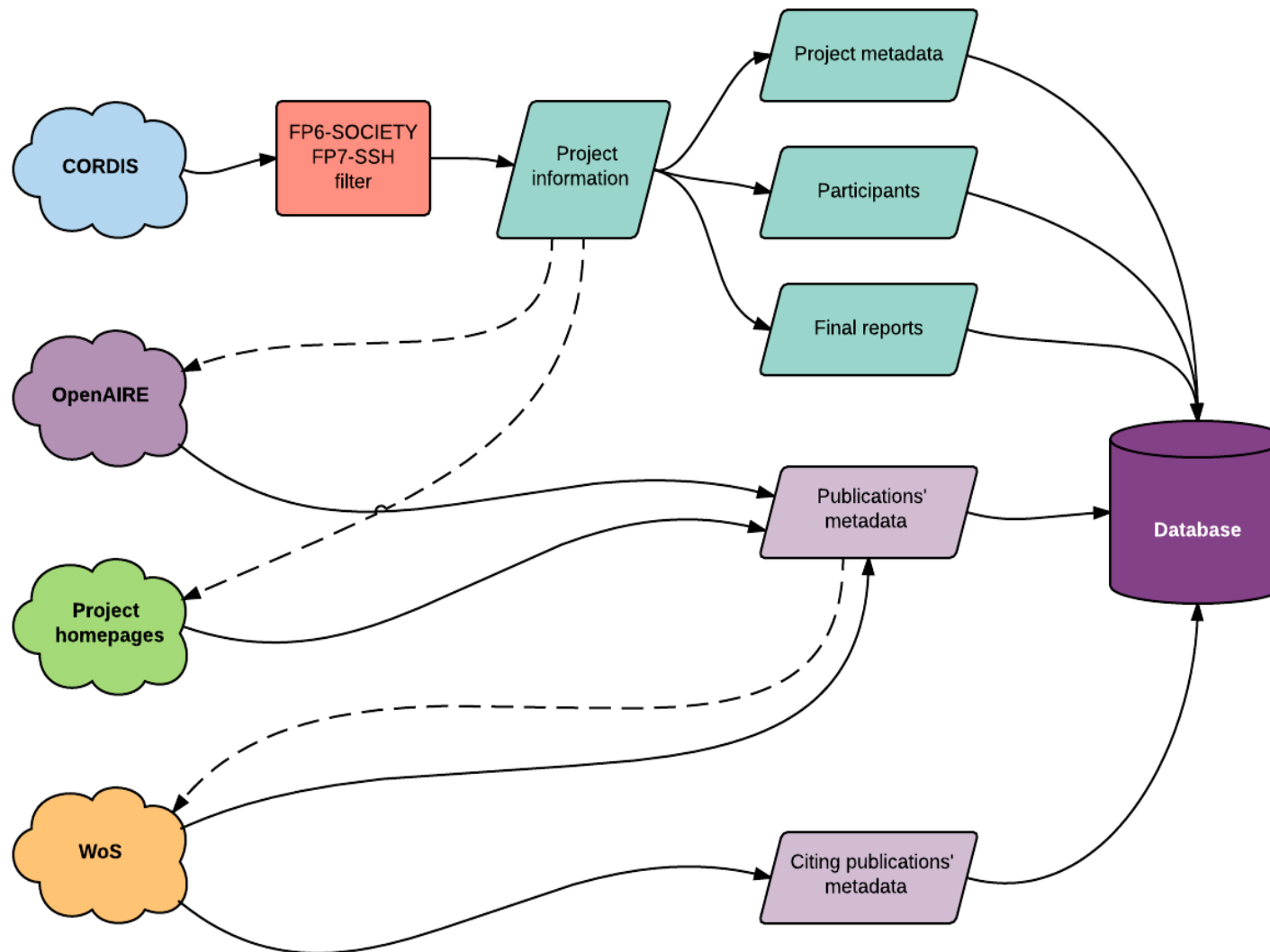| Indicator description	Abbreviation	Dimension	Primary applicability
Web of Science usage count	U2	Usage-based impact	ex-itinere
Mendeley reader count	mend_total_readers	Usage-based impact	ex-itinere
RePeC download count	repec_downloads	Usage-based impact	ex-itinere
RePeC views count	repec_views	Usage-based impact	ex-itinere
SSRN view count	ssrn_views	Usage-based impact	ex-itinere
SSRN download count	ssrn_downloads	Usage-based impact	ex-itinere
Altmetric score	altmetric_score	Usage-based impact	ex-itinere
Twitter count	tweets	Usage-based impact	ex-itinere
Number of likes	likes	Usage-based impact	ex-itinere
Number of page likes	page_likes	Usage-based impact	ex-itinere
Number of comments	comments	Usage-based impact	ex-itinere
Number of shares	shares	Usage-based impact	ex-itinere
Number of posts	posts	Usage-based impact	ex-itinere

- (RQ1) Given the pool of European funded SSH projects, do these indicators signal different impact dimensions, as it was assumed in our proposal? If so, do empirical results support our taxonomy, i.e. outline similar dimensions?

- (RQ2) Can the pool of European funded SSH projects can be characterized along these dimensions and indicators? Are there recognizable „impact profiles", that is, groups of projects sharing a similar composition of indicator values? Do impact profiles correlate with project type, funding scheme or other formal attributes of SSH projects?

Data collection: project and bibliometric data

Ratio of Publication Categories
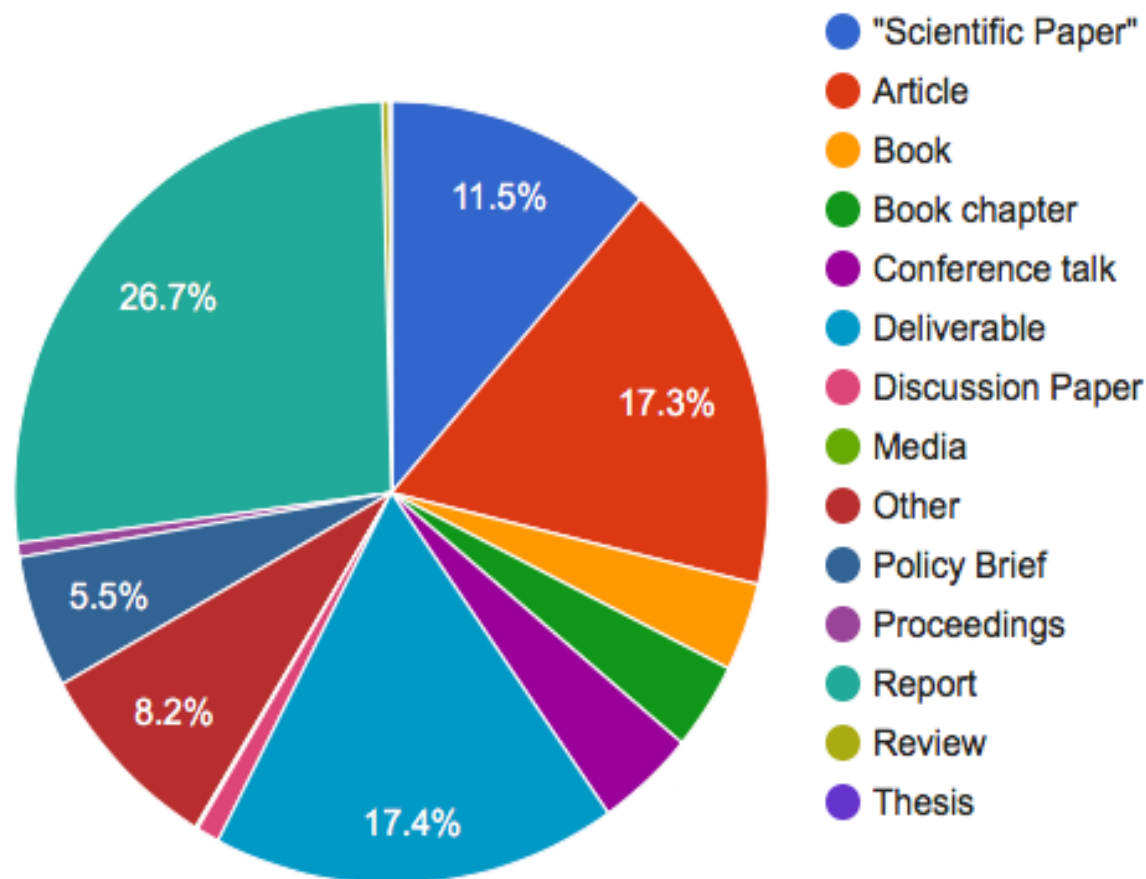
Legend:
- "Scientific Paper"
- Article
- Book
- Book chapter
- Conference talk
- Deliverable
- Discussion Paper
- Media
- Other
- Policy Brief
- Proceedings
- Report
- Review
- Thesis

Values shown on pie chart: 11.5%, 17.3%, 26.7%, 5.5%, 8.2%, 17.4%
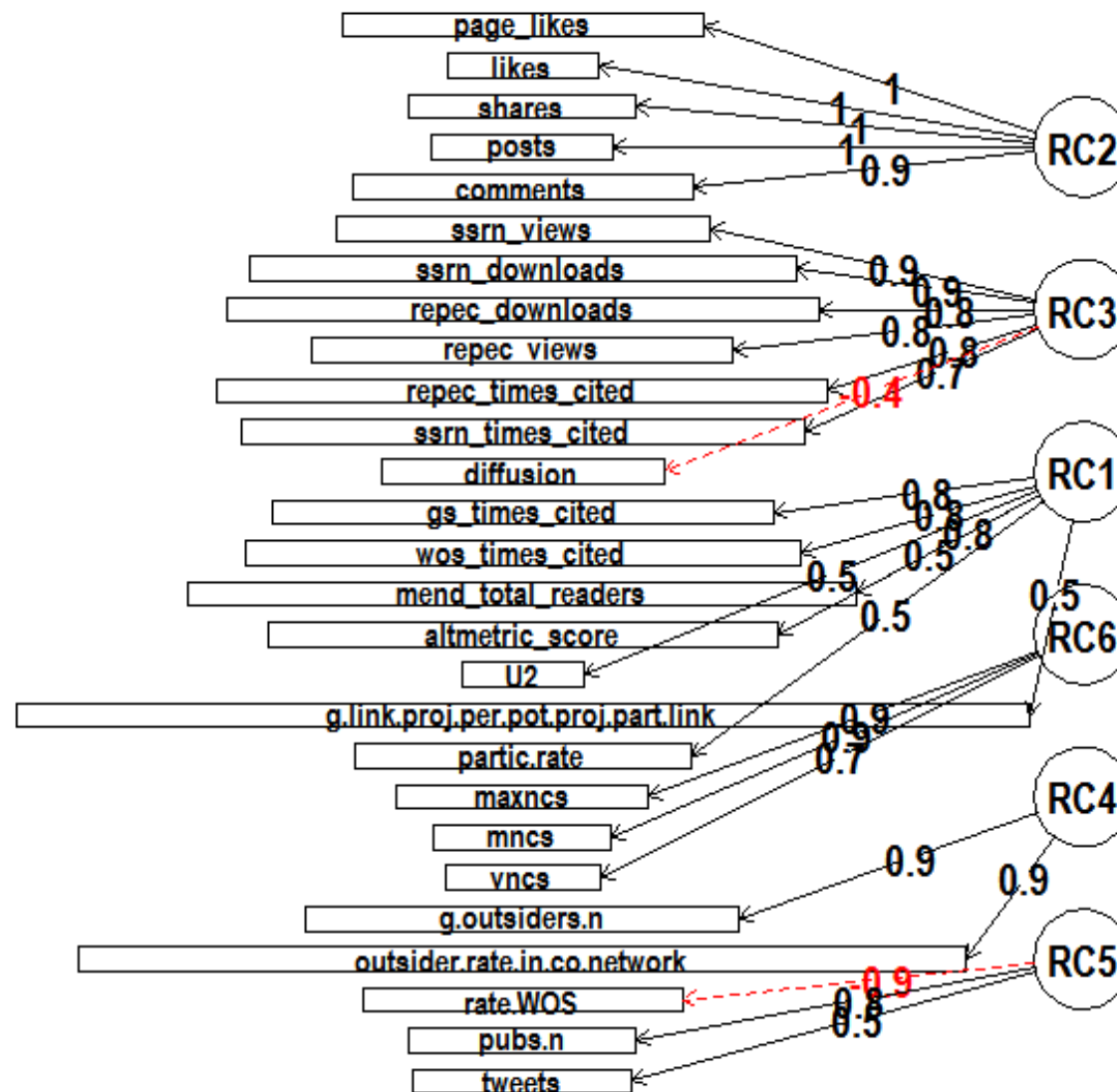
- (RC1). **Size-dependent** total citation measures (gs_times_cited, wos_times_cited), size-dependent measures of scholarly usage (mend_total_readers, altmetric_score, U2), and measures of internal collaboration and activity (partic.rate, internal collaboration density).

- (RC2) **Web-based usage** impact reflecting a **broader audience** (comments, posts etc.)

- (RC3) The third component covers the visibility and impact expressed through **domain-specific repositories and social networks** (RePeC, SSRN).

- (RC4) IIdicators of **mobilizing third party collaborators** through the project (outsiders.n, outsider.rate)

- (RC5) Number of publications (pubs.n), and a general web-based indicator (tweets). Massive **negative loading of the share of WoS-indexed papers** in the total publication output (rate.WoS).

- (RC6) Context-sensitive measurement of **citation impact** (mncs, vncs, maxncs).

Results: Impact profiles (project grouping)
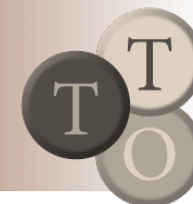
Indicators/Clusters	1	2	3	4	5	6	7	8	9	10
pubs.n	0.55	0.61	0.58	0.46	0.42	0.59	0.62	0.77	0.00	0.80
rate.WOS	0.63	0.60	0.74	0.45	0.55	0.80	0.83	0.72	0.00	0.76
mncs	0.10	0.05	0.46	0.00	0.00	0.37	0.65	0.71	0.00	0.65
vncs	0.04	0.03	0.16	0.00	0.00	0.24	0.63	0.56	0.00	0.65
maxncs	0.09	0.05	0.40	0.00	0.00	0.35	0.68	0.72	0.00	0.75
g.outsiders.n	0.21	0.12	0.47	0.01	0.00	0.67	0.68	0.61	0.00	0.75
outsider.rate.in.co.networ	0.20	0.12	0.51	0.01	0.00	0.71	0.56	0.54	0.00	0.64
g.link.proj.per.pot.proj.par	0.28	0.17	0.57	0.01	0.00	0.61	0.76	0.68	0.00	0.72
partic.rate	0.18	0.09	0.33	0.01	0.00	0.38	0.74	0.54	0.00	0.75
wos_times_cited	0.12	0.14	0.50	0.02	0.01	0.13	0.73	0.44	0.00	0.74
gs_times_cited	0.22	0.19	0.48	0.04	0.08	0.18	0.77	0.66	0.00	0.84
mend_total_readers	0.27	0.14	0.41	0.03	0.03	0.19	0.78	0.71	0.00	0.82
repec_times_cited	0.44	0.00	0.07	0.00	0.02	0.01	0.38	0.32	0.00	0.77
repec_downloads	0.52	0.00	0.03	0.00	0.02	0.00	0.30	0.35	0.00	0.77
repec_views	0.50	0.00	0.03	0.00	0.01	0.01	0.32	0.33	0.00	0.77
altmetric_score	0.09	0.17	0.10	0.00	0.01	0.11	0.51	0.67	0.00	0.57
ssrn_views	0.40	0.00	0.04	0.00	0.01	0.01	0.06	0.14	0.00	0.79
ssrn_downloads	0.41	0.01	0.04	0.00	0.01	0.00	0.07	0.15	0.00	0.75
ssrn_times_cited	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.59
tweets	0.23	0.49	0.16	0.63	0.00	0.10	0.05	0.54	0.05	0.06
likes	0.00	0.72	0.00	0.02	0.01	0.01	0.00	0.75	0.00	0.00
page_likes	0.00	0.71	0.00	0.02	0.01	0.01	0.01	0.78	0.00	0.00
comments	0.00	0.69	0.00	0.02	0.02	0.01	0.01	0.78	0.00	0.00
shares	0.00	0.74	0.00	0.02	0.01	0.01	0.01	0.74	0.00	0.00
posts	0.00	0.64	0.00	0.02	0.01	0.02	0.00	0.71	0.00	0.00
diffusion	0.06	0.06	0.73	0.02	0.00	0.02	0.45	0.33	0.00	0.27
U2	0.14	0.05	0.31	0.00	0.01	0.44	0.73	0.59	0.00	0.73

1. High publication rate and medium position for the share of WoS papers. Relatively low normalized citation impact (for WoS), but a farely good amount of RePeC and SSRN communication (downloads, views etc.). N=13.

2. **High publication rate and share of WoS papers, low rank on most publication-based impact dimensions, but high rank for web-based activities (likes, tweets etc.) involving mainly indicators of „social impact". N=7.**

3. High publication rate and even higher share of WoS papers, moderate citation impact but stronger mobilizing effect (internal collaboration density, ivolvement of third parties). This is the cluster where interdisciplinary knowledge trasfer (diffusion) shows a high and the highest rate. N=34.

4. In this cluster, medium position is exhbited both with respect to publication rate and WoS visibility, and only a single web-based activity is ranked high, namely that of tweet count. N=44.

5. This group is positioned fairly good with respect to publication rate and the share of WoS-index publications, but shows weak positions in the ranking of indicator values. N=122.

6. **This group shows a strong publication rate and a truly high share of WoS-publications. While the citation impact is relatively low for this group, the mobilizing effect is striking with internal collaboration density and third party inclusion. The group is ranked fairly good on the U2 indicator, that is, the usage of WoS-outputs. N=37**

7. **Projects in this cluster rank high on (1) publication rate, including WoS-publication ratio, (2) citation impact, (3) mobilizing effects (4) scholarly usage-based impact (both for altmetric sources and WoS), and even (5) show a moderate position on interdisciplinary knowledge transfer. N=34.**

8. Cluster 8 is very similar to Cluster 7 with being even more „successful" in that Cluster 7 also ranks high on web-based usage indicators reflecting a broader audience.

9. Cluster 10 is also a „success group", similar to Cluster 7 and Cluster 8: the difference is that, in this case, the impact of output in field-specific repositories (SSRN, RePeC) is the dominant „alternative" channel instead of web-based communication with a broader audience.

Main conclusions

- The empirical taxonomy is rather close to the conceptual one. Six dimensions of measurement can be formulated as follows: (1) Impact size, including various impact channels, (2) on-line reflections, (3) Visibility and knowledge transfer through domain-specific channels, (4) Mobilizing effects with respect to academic collaborators (5) general productivity and (6) context-sensitive („true") citation impact.

- Indicators allowed us to detect different impact profiles among project. They showed different combinations of impact dimensions.

- Many funding schemes and programmes could be associated with typical impact profiles, others showed a more balanced distribution between different impact clusters.

Acknowledgements

- This work was supported by the European Commission under the FP7 Grant No. 613202 (IMPACT-EV project).

- Thank you for your attention!