Developing Wikimedia Impact Metrics as a Sociotechnical Solution for Encouraging Funder/ Academic Engagement

Brett Buttliere
University of Warsaw

Matthew Vetter
Indiana University of Pennsylvania

Sage Ross
Wiki Education

Abstract

Wikimedia is where people look for information, and scientists want to make their science open, but scientists do not often engage with Wikimedia. This research investigates how we can encourage scientists to engage with Wikimedia, especially through the development and design of Wikimedia Impact Metrics as a sociotechnical solution. Developing metrics and making them available to Altmetric aggregators will be instrumental in encouraging relevant systems of credibility for scientists as well as helping funders to accept and encourage Wikimedia engagement as grant outcomes.

Academics that engage now often face an opportunity cost related to the fact that they are not working on conventional research outputs, which results in lower professional outcomes related to promotion, funding, and recognizable achievement. This research surveys Wikimedians on what metrics would be most useful for indicating impact, and builds a minimally viable product to demonstrate some basic statistics (Table 1) and elicits feedback from the community. Throughout, we aim to build a community working toward this goal and to develop larger grant applications as a work package.

Introduction

The main problems we seek to solve are the low levels of academic engagement in Wikimedia, and the (lack of) professional recognition that academics and volunteers receive for engaging (Jemielniak & Aibar, 2016; Konieczny, 2016). Our project addresses these by researching, developing, and making available so-called Wikimedia Impact Metrics, which demonstrate the impact of contributions. In conjunction with this, we aim to build a consortium of researchers in the academic community to push funders and universities to value these contributions and apply for larger grants.

The basic argument is that scientists want to make their knowledge open, and Wikimedia is where the public looks for information, but few scientists engage with Wikimedia. Research suggests this is in part due to a lack of incentives to engage (Chen et al., 2023; Kincaid et al., 2021; Taraborelli et al., 2011), and thus we develop Wikimedia Impact Metrics and encourage funders to value them as grant outcomes.

At the end of the grant, we expect to have built a community with the survey, developed some basic metrics, and a demonstrator that the community can provide feedback on.

Wikimedia's unique position
Wikimedia holds a unique position in the digital knowledge landscape, being open, trusted, and quite accurate in general. Unfortunately, researchers and scientists rarely engage with Wikimedia, sometimes even banning it from the classroom, despite the fact that they know it is where people look for information, and even often use it themselves for basic knowledge.

Wikimedia also forms the basis of knowledge for e.g., Google searches, OpenAI, Virtual Assistants, and many other public knowledge infrastructures. We believe scientists have or should have an interest in making sure this knowledge base is as accurate, updated, and robust as possible. That involves experts, including scientists, contributing.

Scientists should engage with Wikimedia
Beyond its value as a public service, engaging with Wikimedia can also be beneficial for science and scientists. The publication system has many problems, and growing numbers of researchers suggest that we move toward a more Wiki model of science (Besançon, 2021; Buttliere, 2014; Poulter & Sheppard, 2020).

No matter how credible Wikipedia is (or is assumed to be), the public is looking at it, so we think scientists, and experts in general should be contributing. Unfortunately, few scientists engage with Wikimedia, in part, we believe, because they are not rewarded for doing so (Chen et al., 2023; Buttliere, 2014).

This is an important problem to solve because even while scientists look for ways to make their science more open and impactful, contributing to Wikimedia has an opportunity cost and can even cost the academic. This is a problem both for specific Wikimedians, but also the movement as a whole, hindering engagement among experts and overall participation.

Scientists engaging with Wikimedia select themselves out of the scientific system.
Even though scientists engaging with Wikimedia is good for Wikimedia and the world in general, when a scientist engages with Wikimedia currently, they are spending time that they could be spending on conducting original research, publishing academic articles and books, and presenting their work at professional conferences; activities that are clearly legible to internal and external committees that make decisions related to tenure, promotion, and overall scholarly merit and hireability.

Almost every Wikimedian knows of a case where someone in the community was doing great work, but because they were not publishing or etc as much in the traditional academic sense, they were denied tenure or some other position or opportunity.

The fact of the matter is that contributing to Wikimedia is not sufficiently valued among academic communities, and we believe this is because there does not exist 1) a viable and accurate system of metrics about contribution, and 2) sufficient, generalizable models that academics might emulate to demonstrate the impact that contributing has. This project works to solve both of these problems.

Creating the metrics we wish to see
We believe that a significant part of academics' hesitancy to engage Wikimedia is due to the fact that they are not rewarded, or even credited, for their labor. Even if a Wikipedia article garners 10, 20, or 30 times the pageviews, and has significantly more measurable impact, it does not directly relate to what is considered the universal capital in academic communities: citations of one's original work.

To incentivize engagement, then, contributions should be tracked and made available in formats that (academic) decision-makers appreciate and

value. And work needs to be done to make academics see the value in this work. Thus our team has set about creating a set of Wikimedia Impact Metrics that go beyond citations in Wikimedia, and toward authorship and contribution of pages and words.

This move toward the creation of the metrics that we wish to see in the world is in general part of the 'altmetrics' movement (Buttliere & Buder, 2017).

Creating Wikimedia Impact Metrics to reward engagement

In order to solve this problem, our team is engaging in the research and creation of Wikimedia Impact Tracker and related Wikimedia Impact Metrics. These are metrics not only for e.g., number of edits, links, references (in Wikipedia), media files (in Wikimedia Commons), or items and properties (Wikidata) contributed, but also the cumulative effect of those contributions on the Wikimedia consumer of that knowledge. That is, the tool should also track not just contributions but also pageviews clickthroughs, and other useful metrics for the contributed content.

These metrics should be able to be accessed through a dashboard at the author or project level such that one can look across an author's entire contribution and impact, for instance to report to a university, or at the project level, for instance to report to a funding agency. Key is that funders and universities should also be able to look across authors and projects to e.g., identify the collective impact of a particular funding scheme or hiring under an initiative.

Our goal is to provide professional credit to those already in the movement as well as encourage others to join (Strategy 2030 1.1: Support Volunteers). We approach this topic from three directions, each corresponding to

one co-PI, with each work package (WP) estimated at approximately 3-4 months work.

These Work Packages (WPs) include:

WP1: Surveying key Wikimedians/ Decision makers on what metrics they value.
WP2: Examining existing metrics, developing desired metrics, and presenting them for use.
WP3: Developing a minimally viable version of the Wikimedia Impact Tracker for presentation.
WP4: Presenting to relevant stakeholders, building a consortium, and submitting grants.

These work packages combine quantitative, investigative, and qualitative research to solidify Wikimedia's position as an Open Knowledge platform, positioning Wikipedia as an interface between Science and the Public. Additionally, it plans for the future implementation of these metrics throughout the community, builds a team, and anticipates the future of the project.

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Related work

There are a number of related initiatives, which we have grouped into three main sections, being Tools that make Wikimedia statistics available, Bibliometrics that are related to Wikimedia, and Making Wikimedia cool.

Tools that make Wikimedia statistics available

There are several tools that make statistics available (e.g., Xtools, Event Metrics), as well as many tools for specific purposes e.g., the Programs and Events (P&E) Dashboard, Scholia.

Wikimedia Statistics is an example of a statistical suite capable of tracking metrics related to reading, contributing, and content across all projects. To our knowledge, none of these tools are focused on the impact of Wikimedia as scholarly output.

Metrics that are related to Wikimedia
There have also been some efforts to create bibliometrics about wikimedia, for instance how often a paper is cited or how full or well linked a university's page is. The conclusion, at least in 2016, was that only about 5% of authors are cited at all and so it is probably not worth it (Kousha & Thelwall, 2017). More recent efforts have focused on the relationship between how often the page of a university is visited with other bibliometric indicators (Arroyo-Machado, Díaz-Faes, Herrera-Viedma, & Costas, 2023). This does not really incentivize contribution, as it is a measure of prestige.

As far as we know, also in looking at e.g., Wiki developer communities, there are few if any tools or metrics created for academics to show their contributions and productivity on Wikimedia to e.g., academic decision makers.

Making Wikimedia cool or valuable
There are many efforts to improve the value of Wikimedia, or to put more information onto it, but there are few that try to make Wikimedia compelling or attractive, among academics. And even fewer that are using metrics.

Edit-a-thons are an excellent example of initiative that work to make Wikimedia cool. Our work is different in the sense that we hope to create metrics of impact, which are 'valuable' in themselves as evidence of impact , and in turn will hopefully lead to greater engagement. Aside from making the metrics available, we are also pushing for them to be valued among academic organizations, at the same time, rewards those who are already engaged while encouraging others to join.

Wiki Education oversees two relevant programs that encourage academic and professional participation in Wikimedia projects: the Wikipedia Student Program, and the Scholars & Scientists Program. Their student program has brought in over 126,000 student editors ("Impact," 2022). However, these editors often are there for grades and assignments. Their Scholars & Scientists program is more relevant to our project in that it enables experts to contribute, though it does not seek to solve the underlying issue of academic credit. Sage Ross was the lead developer of the P&E Dashboard and will also be the lead developer here.

Competencies of the research team
Brett Buttliere is an Assistant Professor at the Centre for European, Regional, and Local Studies, University of Warsaw. He has done research on the history of science using Wikimedia, and on how Wikimedia can help make science open. He works on digital infrastructure for science in general, especially by keeping in mind the psychology of the scientist, since they are the ones actually doing the science and making the decisions.

Matthew Vetter is a Professor of English at Indiana University of Pennsylvania. He co-chairs the CCCC Wikipedia Initiative, a disciplinary project to involve more English Studies academics to contribute to Wikimedia via WikiProject Writing. He is the author, with Zach McDowell, of *Wikipedia and the Representation of Reality* (Routledge, 2021). He is a veteran instructor with Wiki Education, as well as a researcher on Wikipedia-based education. He has also served on the Wikimedia Foundation's North America regional grants committee for the past three years.

Sage Ross is Chief Technology Officer of Wiki Education and the main developer behind the P&E Dashboard. He has developed many metrics related to Wikimedia and its utilization, and the P&E Dashboard has been used across hundreds of initiatives, programs and systems wikimedia wide. He has extensive background and experience with developing websites and successful Wikimedia tools.

Methods

There are four specific goals of the project,

1. Survey and interview Wikimedians to understand what metrics are good for indicating impact.
2. Develop some basic metrics of impact including contributions, pageviews, clickthroughs, and others.
3. Develop a minimally viable product (MVP) that presents some basic statistics such as edits and views.
4. Develop and apply for larger grants including conference and EU grants for e.g., science communication.

Our goal is to understand how Wikimedia can strengthen its position in the knowledge ecosystem through the engagement of academics and other experts, especially through the development of metrics of impact.

This goal is particularly relevant because it provides professional credit to those already in the movement as well as encouraging others to join (Strategy 2030 1.1: Support Volunteers). We approach this topic from three directions, each corresponding to one co-PI, with each estimated at approximately 3-4 months work.

Methods for the survey:
The idea is to survey Wikimedians, and organizers of events at academic associations (as represented by the organizer), on which metrics they think indicate impact.

The sample for the survey will come from two sources. First, our project team is currently engaged in a Rapid Grant where we examine and collect data on how various professional organizations are engaging with Wikimedia. This project involves surveying 200 academic association's websites for Wikimedia related activities and identifying the people in these organizations who have engaged or helped develop Wikimedia related activities within those organizations (so called organizational champions).

Aside from these organizational champions, an identical but separate survey will be spread throughout our networks, especially the Wikimedia Research Group, Wikimedia Education, Edu Wiki User Group, CCCC Wikipedia Initiative / Wiki Project Writing, OpenCon, SPARC Open Forum. Additionally, Chris Shilling has offered to let us email those they have funded in the past, to ask how they would measure their impact. Finally, if needed, we intend to leverage the network of Jamie Mathewson at Wiki Education to identify champions who might have interest in the topic to take the survey.

The current draft of the survey is available here, and we welcome feedback on its further development including any particular questions to be asked or themes to be investigated.

Methods for Metric Development
The goal is to develop bibliometric indicators for researchers. Establishing effective bibliometrics involves a series of standard steps and set points which are used to understand the new tools and in comparison to other metrics.

Aside from these individual metrics are necessary considerations at the aggregate level. The current P&E dashboard is for looking across users, and it will likely be of use to funders and decision makers to be able to see e.g., across several years of their funding efforts who is having impact, and in what areas.

Currently, our team is considering metrics of contributions and metrics of impact, as laid out in Table 1. Many of the metrics are 'standard' in the sense that they are already made available through the P&E Dashboard.

Table 1: Suggested impact metrics to examine.

Contribution	Impact
Words added	Views
Articles added	Views
References	Click-throughs
Wikilinks	Click-throughs
External links	Click-throughs
DOIs added	Click-throughs
Wikimedia uploads	Downloads

These two different types of metrics match fairly well onto existing metrics both in science and e.g., online business (views and click throughs). In science, these can be the creation of data or papers, and then citations.

A more important aspect of this work will be determining which edits are relevant to the grant and which are not, especially when users have multiple ongoing grants for which not all edits are relevant. Currently, the P&E Dashboard allows users to choose target articles and categories to include in metrics, but we suspect that we will also need to be able to select edits to be e.g., within the grant date, and also some mechanisms will need to be considered to prevent double dipping.

Finally, it will be important to think about how the metrics can and will be "gamed" (Oravec, 2019) or used (and to work toward its prevention).

Methods for tool development
The main goal of WP3 is the development of a Minimally Viable Product (MVP) that can be presented to the community for feedback. This project will be based on the P&E Dashboard.

The P&E Dashboard is mostly used 'internally', within Wikimedia or within classrooms or particular programs or events to track contributions and impact. The goal here will be to rework it in small ways such that it is more accessible and useful for individual researchers, universities, and funders, compared to Wikimedia program directors looking to track developments.

Figure 1: Existing P&E Dashboard. Each campaign can be a grant class.
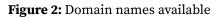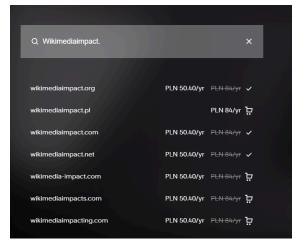

This reworking will involve renaming some various portions, and most importantly, enabling authors to easily package particular edits as 'project relevant' in a way that then funders or universities can examine and isolate as parts of e.g., tenure packets or grant outcomes. This is the major research and development part of the project.

The idea is to stick as closely as possible to the P&E Dashboard, and mostly focusing on making it more administration and evaluation friendly. Most of the metrics that are used on the P&E dashboard will remain, though we look to develop them with the results of the survey.

We do expect to develop a new website to accommodate this tool. Wikimediaimpact.com and Wikimediaimpact.org are available for approximately 50$ per year.

Developing this functionality will serve two purposes, since the technology will also be

implemented into the P&E Dashboard, such that editors will have better control over which of their edits are program and event relevant.

Figure 2: Domain names available

Presenting, team building, and grant writing
A significant portion of the work is presenting the work, team building, networking, and identifying people to further develop the tool with. It does not really make sense to build this tool unless we will market and advertise it so that it can be effectively used.

We expect at the end of the year to have presented the project at least three times at the Wiki Workshop, Wikimania 2024 (Katowice), as well as at the Research Evaluation in the Social Sciences and Humanities Conference in Galway, Ireland. These opportunities represent excellent venues to gather opinions both within the Wikimedia Community as well as the Research Evaluation community.

Building this team is more than side or part time work, and we changed the project from Stage 1 to make this work more explicit, since it is not an insignificant amount of work to build a team or apply for large scale grants.

These work packages combine quantitative, investigative, and qualitative research to solidify Wikimedia's position as an Open Knowledge platform, positioning Wikipedia as an interface between Science and the Public.

Expected output

This grant will support the development of several expected outputs, including at least one scientific paper outlining the argumentation and survey results, the development of the WikimediaImpact.org website, several conference papers, and the development and submission of at least one grant to support continued development.

Publish an academic paper
Our goal is to publish a paper and several conference papers outlining the work and idea. The goal of the main paper will be to have widespread impact and an introduction to the tool with examples making the argument in a major journal.

We will target high impact journals such as Science or Nature, but also concede that the paper may be published in Scientometrics, Quantitative Science Studies, or other venues where bibliometrics are valued.

Minimally Viable Website and Tool
Creating the metrics and functionality are not useful if they are not made available to the public. Thus, we expect to develop a minimally viable product (MVP) which is not intended to be a final product, but the most basic functions possible, which we can receive feedback on.

Conference presentations and panel
As outlined in the Methods section, we expect at the end of the year to have presented it at least three times at the Wiki Workshop, Wikimania 2024 (Katowice), as well as at the Research

in Galway, Ireland.

Group that is working toward this goal
The goal is not just to develop the metrics and tools, but to build a community that will help implement this goal and vision for Wikimedia.

These people will be gathered through various means including the interviews we conduct, the survey we run, and the various presentations and activities in the meantime. The goal is that we will be able to develop further grants with this team that is developed, and that we should be able to apply at least for one grant.

Risks

The major risk is that we simply are not able to recruit the users that we need for the system to be effective. That academics do not care about the metrics we create. This is also part of the reason why we intend to focus on Wikimedians first, asking them about what metrics they think are useful.

Time commitment represents an additional challenge. This is also, in part, why we included salary time, such that we can work on this project without giving up something else in other parts of our life.

Finally, there is a risk that scientists coming to Wikimedia to talk about their expertise will be conflicted in their presentation and importance of that work. This is a significant problem, but one that can be kept in check through communal mechanisms. We plan to mitigate this risk through education about relevant Wikipedia policies such as WP:NOR and WP:COI. In the end these are the people who are literally the world experts on their topics.

Community impact plan

The goal of our proposal is to help Wikimedians get professional credit for the work they are doing, and to encourage others to contribute to Wikimedia by providing professional credit. This has the potential to strengthen existing communities as well as bring new communities into the movement.

Get Wikimedians the credit that they deserve
The long term goal of the project is to provide Wikimedians with credit for their work, which should in turn lead to higher engagement. Our long term goal is to develop Wikimedia as a central infrastructure for open science. This means being where scientists upload their scientific data, and where students go for the most up to date information on the topics and textbooks that are free from the WikiBooks tool. We believe Wikimedia can achieve this.

Bringing new academic editors into the mix
In this sense, we hope that the impact will compound as more academics become involved. The goal is to make a tool so useful and valuable that academics take the time to learn it on their own (Buttliere, 2014), the same as other technologies like social media, cell phones, cars, or the internet.

Demonstrate the value that Wikimedia has
A major hurdle to overcome will be to demonstrate the impact that Wikimedia has. This will be done in a series of papers which will build on these metrics to e.g., argue that the average Wikimedia edit has more impact than the average scientific paper, would be an exciting paper that we would like to write and that would build on these metrics.

Solidify Wikimedia's position in the space
The long term goal is to use Wikimedia to provide services to academics, in a harmonious relationship to strengthen Wikimedia's position.

Evaluation

We will consider our project a success if we are able to:

1) Collect at least 100 responses to the survey (initial sample includes 200).
2) Develop an MVP of WIT tool/website.
3) Present the idea at least twice.
4) Submit the paper to a journal.
5) Develop at least 1 grant application.
   a) Ideally 2 grant applications.

These are relatively high goals for 1 year part time work, and so we prioritize the first three points, while setting for ourselves the other two as goals.

Through these activities, we hope to grow and activate a team that will push for academic engagement. If we can double our team size with committed members, that would already be a great success for this year.

Budget

The three work packages are expected to take approximately 3-4 months full time work per researcher. The provided estimates also include the costs of hiring RAs in their respective areas if need be. This will need to be decided depending upon other funding and demands on time. Our institutions will match or cover other funding if need be.

The costs associated with the website are estimated to allow for its maintenance for at least 3 years, by which time we expect further funding.

The provisional budget is as follows, with the each estimation including RA work:

- $12,000 to University Warsaw/ Team 1 ~ 1 day per week. Leading WP1, managing admin for project.

- $12,000 to Indiana University of Pennsylvania/ Team 2 ~ 1 day per week. Leading WP3, interfacing Wikimedia groups.
- $6,000 to WikiEd / Ross ~ 1-2 days per month. Lead WP2, Metrics development.
- Institutional overhead $7,500
- 1 Conference trip per coPI, $1,500 to go to one conference/ meeting each.

Total, 42,000

A link to a more specific budget can be seen [here](#).

Response to reviewers and meta-reviewers

In response to reviewers, we have focused on clarifying and adding significant detail concerning the work to be done. We have also been more specific on the targets and work packages, especially concerning the metrics that we expect to build and the survey that we intend to implement.

Throughout this process, we have focused on making clear that our target is a minimally viable product with some understanding of what should be developed next or after this.

We additionally made it more clear that developing the network and writing the grant applications will be substantial work that we consider as a part of the grant.

We also included sustainable funding for the website, which was overlooked at Stage 1.

We understand that the committee felt that three conference trips could be considered excessive, and we would like to emphasize that these trips are both important to market the work, but that they also serve as important

meeting points with the community. If we are careful about how we use the funding, it will enable us to meet twice throughout the year, so that we will be able to meet each 6 months throughout the project.

In order to scale down the scope of the work, we have changed the wording of the proposal to reflect that this is a minimally viable product, and to make it more clear that it will be based in large parts on the existing Program and Events Dashboard that Sage Ross (CoPI on this project) designed. Many of the metrics we intend to use are also used in this tool, which makes it easier.

Finally, we have made available the current draft of the survey available here, as per reviewer request, and would welcome feedback.

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