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► **To cite this version:**

Loup Cellard, Everardo Reyes-García. Mapping transparency issues in design and technology. Wikipedia Case Study.. Interface Politics Conference, Apr 2016, Barcelone, Spain. hal-04798199

**HAL Id: hal-04798199**

**<https://hal.science/hal-04798199v1>**

Submitted on 22 Nov 2024

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## Mapping transparency issues in design and technology Wikipedia Case Study

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**Keywords:** transparency, opacity, graphical user interface, media archaeology.

### Abstract:

In this paper we present the preliminary steps of a project, which aims to understand the uses of transparency - both formal and metaphorical - and the meanings this concept acquires across multiple contexts: arts and design, digital culture and politics. Specifically, it aims at understanding the mechanisms through which a *politics of transparency* is enacted in different situations. We choose Wikipedia interface and Mediawiki software, as a first site of inquiry. Using digital methods, we try to evaluate the degree of "transparency" and "opacity" of the wikipedia platform. It appears that even if wikipedia interface seems transparent and with a low level of entree for content edition, the whole wikipedia governance seems difficult to appreciate from the interface. The analysis of the PHP source code of Mediawiki, gives us some metrics of the code complexity but this analysis is limited: most of the code generated is disseminated in hundreds of tools difficult to addressed. We want to show that the transparency of wikipedia is difficult to evaluate because of the interface effects revealing or hiding the negotiations about transparency between users and between the interface and the code.

### INTRODUCTION

Transparency is increasingly becoming a "matter of concern" (Latour, 2003) across a number of domains and disciplines and in a variety of contexts. Regarding digital interfaces, for example, we (as public and users) are perpetually solicited by calls to increase transparency in the way that online platforms handle and act on the data generated by communities. As it happens in public governance, transparency in digital design is never given nor taken for granted, rather it is something chosen, negotiated and won. For us, transparency can be considered a place of contestation in itself, oscillating between the presence or absence of mediation practices.

Because recent contestations around transparency often emerge in the domain of digital technology, this project will specifically address the design of such technologies and the consideration of the injunctions to specific behaviours and practices, the "scripts" (Akrich, 1987) inscribed in them defining their scenarios of use. But how to identify the material and aesthetics manifestations of a *politics of transparency*? To tackle this question, we propose a set of experimentations dealing with transparency issues in Wikipedia, based on qualitative and quantitative analysis of both its graphical interface and source code.

## WIKIPEDIA CASE STUDY

We chose Wikipedia as a starting point and case of study. Since its inception in 2003, Wikipedia -and more precisely Mediawiki, the software on which it is built- has been considered by many as a model of transparent system due to its collaborative creation process, governance rules and software features that assist, theoretically, every internet user who wants to make contributions (Benkler, 2005). Technically speaking, both the editorial process and the software of the platform embrace a minimal transparency and openness. In order to better clarify such statement, it is important to highlight that Mediawiki includes different views of an article: we can discover the editorial discussion behind a page within its “talk page” and the history of its edits in the “view history” page.

Given these premises, we specifically focused on one Wikipedia article “4chan”, dedicated to the well-known image-board website. 4chan is a controversial website often criticized for its illegal contents and practices (moral harassment, violation of privacy, pornography) and often cited as the cradle of internet cultures (memes, gifs, video games...). Launched in 2003, the website became one of the first public internet forums, therefore its Wikipedia page has an interesting history and has been promoted as “feature article”<sup>1</sup> based on Wikipedia editorial criteria: “accuracy, neutrality, completeness, and style”<sup>2</sup>.

As previously mentioned, Mediawiki system claims to be constructed on transparency and open procedures. However, Wikipedia, as instantiation of such system, adds social and editorial layers to the already present political and ethical ones. These layers include, for example, the entrée level for new editors and the type of cooperation on the platform defining different social roles for editors (Welser and al, 2011). Of course, as it happens elsewhere, there is a double cooperation between system and user: Mediawiki adapts to practices and evolves in newer versions (at the moment of writing, it is version 1.26.2) and, at the same time, Wikipedia users become more system-savvy and refine their performances. Moreover, the alluded openness in Wikipedia can be appreciated throughout different data visualizations made by the community of developers, researchers, and enthusiasts (see some examples at <http://seealso.org>). Such visualizations rely on APIs and open data to represent content and editorial practices. Other projects, perhaps less appealing visually, are the critiques to Wikipedia editorial rules (90% are male editors<sup>3</sup>, best deleted articles<sup>4</sup>, etc.).

As a consequence, our experimentations<sup>5</sup> have been focusing on: 1) analyzing aspects of the Mediawiki source code and elucidating relationships between source code and graphical interface; 2) depicting interface politics and identifying transparency issues within the platform itself; 3) trying to understand Wikipedia features within the context of “archaeology of transparency”. Our reflections go from material and technical to more wider social and philosophical ones.

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1 A star at the top left notify the page as a feature article.

2 [http://en.wikipedia.org/wiki/Wikipedia:Featured\\_articles](http://en.wikipedia.org/wiki/Wikipedia:Featured_articles)

3 <http://blog.wikimedia.org/2012/04/27/nine-out-of-ten-wikipedians-continue-to-be-men/>

4 <http://gawker.com/the-10-best-articles-wikipedia-deleted-this-week-1749445064>

5 All of our experiments are available as open source: <https://github.com/ereyes/Mapping-Interface-Politics> and can be explored online: <http://ereyes.github.io/Mapping-Interface-Politics/>

# MAPPING TRANSPARENCY ISSUES THROUGH MEDIAWIKI SOURCE CODE

## I) Wikipedia governance, point of view from the code

Besides overall Mediawiki statistics based on general code metrics<sup>6</sup>, we have conducted some experiments for depicting the programming code as text.

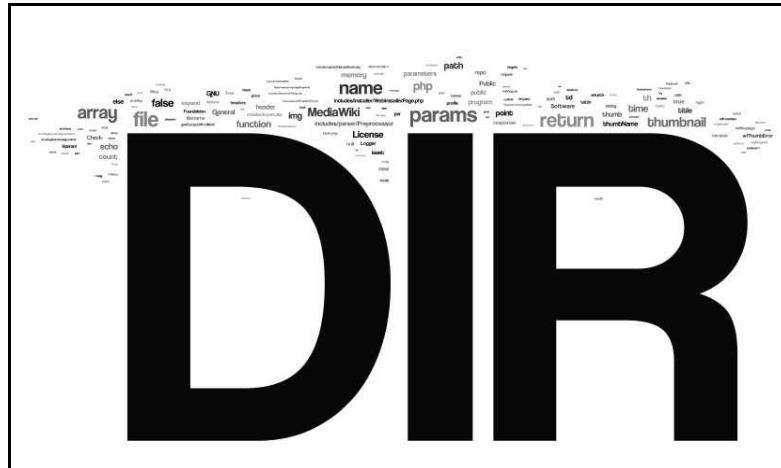


Fig 1 : Word cloud of the eight first-level php files, 3044 lines of code approx. Generated with wordle.net (150 max words, no English common words)

The most frequent word is “DIR”, which appears 1418 times, mainly in the **autoload.php** file. DIR makes reference to one of the eight “magical constants” provided by PHP. `__DIR__` was introduced in version 5.3 (June, 2009), it points to the directory of the file. Figure 2 (left) shows the result if we re-generate the whole cloud without the **autoload.php** file, here the most frequent word is **params**.

The PHP source code is processed in the server side and users do not see variables or functions names in the HTML code rendered by the browser. We can compare relationships between pre and post-compiled code. In this manner, figure 2 (right) shows the HTML source code of a given Wikipedia article, namely 4chan.

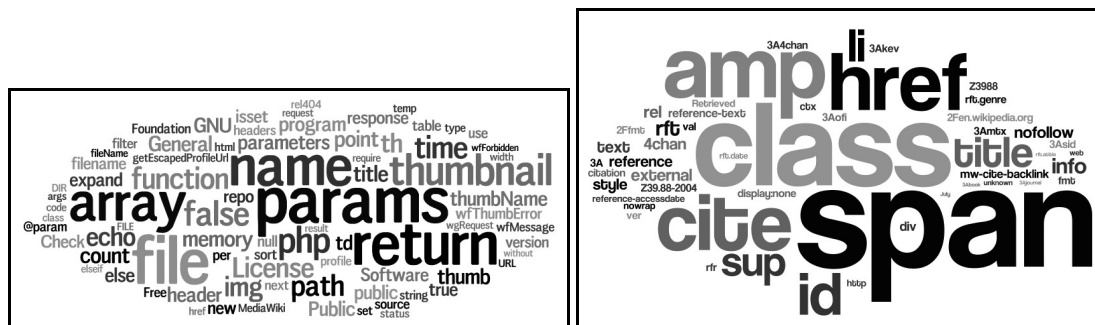


Fig 2 : Left: Regenerating the word cloud without DIR word instances. Right: Word cloud of the html source code of a wikipedia article

6 <https://www.openhub.net/p/mediawiki>

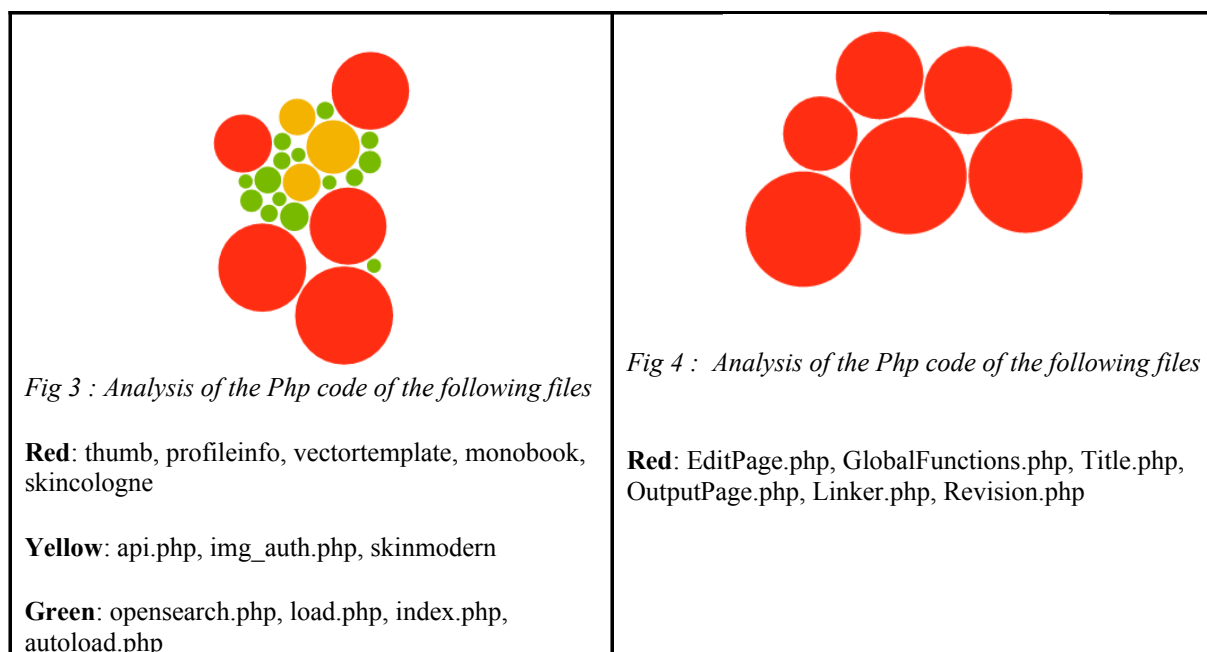
From figure 2 (right) we identify the HTML elements `<span>` and `<cite>`; the HTML attributes `class` and `href`, and the HTML character sign `&amp` (text encoding format). Regarding `<cite>` and `href`, they both relate to external links that ensure the verifiability principle championed by Wikipedia. `amp` in HTML could be related to the word `params` in the PHP source code because the platform is highly customizable and, more interestingly, oriented towards external tools for handling and managing content, a topic we want to discuss in the following section.

## II) Code transparency, maintainability and complexity for wikipedia developers

Using existing methods and tools for software metrics (most notably <http://phpmetrics.org>), we could analyse the PHP code of core components of Mediawiki. These metrics represent mainly two values for each file analyzed:

- Cyclomatic complexity = size of circle. Ideally, lower levels are better, thus **smaller circles**.
- Maintainability index = color of circle. Theoretically, lower values (**red circles**) should be avoided because they indicate more maintenance, redesign or code simplification.

Due to technical limitations (memory allocated to run phar scripts from a Terminal interface) we splitted files into folders. A sample of results is shown below.



From these PHP metrics, a logical hypothesis would be to formulate that those files represented as small-yellow-or-green circles are less maintained and edited in the source code than those bigger-and-red. We can verify this idea thanks to Phabricator, a collaborative platform for Mediawiki contributors.

We selected a couple of PHP files from the source code: `index.php` and `includes/EditPage.php`. As it can be observed, the first file was last edited 4 months ago,

while the latter one day before the analysis. So there appears indeed a certain correlation between metrics and developers edits : complex files are more edited than simple ones.

File: <b>index.php</b> Cyclomatic complexity = 1 Maintainability index = 121 Last modified: Nov 15 2015, 8:14 PM <a href="https://phabricator.wikimedia.org/diffusion/MW/browse/master/">https://phabricator.wikimedia.org/diffusion/MW/browse/master/</a>	File: <b>includes/EditPage.php</b> Cyclomatic complexity = 555 Maintainability index = 35 Last modified: Sat, Mar 19, 12:20 AM <a href="https://phabricator.wikimedia.org/diffusion/MW/history/master/includes/EditPage.php">https://phabricator.wikimedia.org/diffusion/MW/history/master/includes/EditPage.php</a>
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The complexity of the Mediawiki source code extends beyond the mere access via web browsers. Indeed, the software feeds other tools that have been developed for multiple purposes: from monitoring and tracking changes to visualizing statistics and even to geolocating in real time the place where content edits come from.

From the standpoint of Wikipedia content, there is a difference between common users and renowned Wikipedia editors. Aaron Swartz<sup>7</sup> conducted experiments to show how a small part of anonymous contributors are responsible for the core and substantial modifications, while the troops of registered editors concentrate on making content comply to editorial standards.

These editors are also known as the Recent Changes Patrol. Currently there is a list of more than 30 tools of several types (desktop, mobile, web-based) dedicated to facilitate their editorial work<sup>8</sup>, for example: Wikipedia Vision: <http://www.lkozma.net/wpv/index.html>, Snuggle: <https://snuggle-en.wmflabs.org/>, and Vandal Fighter. These tools are part of the Wikimedia Labs, which contains almost 300 tools, instantiated almost 900 times.

In the developer's side, there are also differences and gaps. First, in order to become a developer, besides coding in PHP and mastering the special syntax of Wikipedia magical words<sup>9</sup>, we only get to the status of “maintainer” after a long process of reconnaissance. The following step would be to become a system administrator (there are currently 95, where only 10 act as volunteers) but at this level one has to be appointed by the board of trustees.

To conclude this section, we want to highlight the complexity and ambivalence of transparency. For developers of Mediawiki, they deal with functions and actions supposed to facilitate two main communities: casual editors (who seem to make the substantial contributions to Wikipedia) and renowned editors (who spent their time refining, deleting, discussing, the contributions of casual editors). Where code and interfaces can be mapped and visualized, there are other layers of information that are exchanged in different channels (consider here dedicated software based on Mediawiki code other than Wikipedia, tools for system administrators and maintainers) to which we do not have access and thus we cannot trace interlayer transparency. Again, the obtained data and the artisanally-constructed experimental interfaces should elaborate on those issues.

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7 Swartz, Aaron (2016). The boy who could change the world. New York: Verso Books.

8 [https://en.wikipedia.org/wiki/Wikipedia:Recent\\_changes\\_patrol#Tools](https://en.wikipedia.org/wiki/Wikipedia:Recent_changes_patrol#Tools)

9 [https://www.mediawiki.org/wiki/Help:Magic\\_words](https://www.mediawiki.org/wiki/Help:Magic_words)

# MAPPING TRANSPARENCY ISSUES THROUGH THE ANALYSIS OF WIKIPEDIA INTERFACE

## I) A reverse-engineering interface showing the evolution of 4chan's article.

Figure 5 shows the screenshot of an experimental interface visualization we created to navigate differently through the history of wikipedia 4chan's page from 2004 until March 2016<sup>10</sup>. The changes we observe in the page, allow to draw the history of the evolution of Wikipedia interface features. Such experimental interfaces might inform the development of robust systems devoted to make correlations between the apparition and disappearance of features, the evolution/trending of design and technology on the web as well as users actions on content or even the community of developers that contribute to Mediawiki source code.

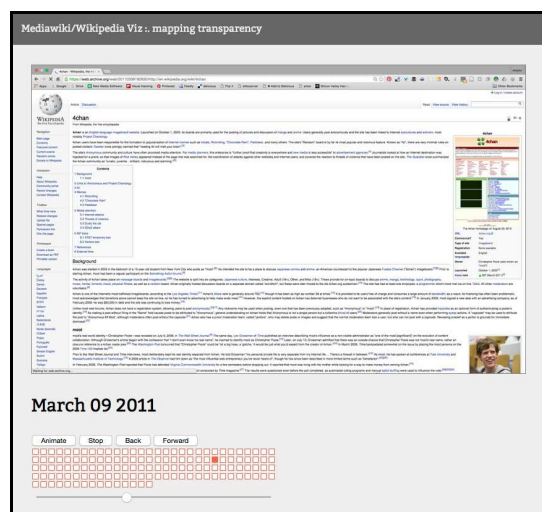


Fig 5 : Experimental wikipedia reverse-engineering interface.

We gathered screenshots from Internet Archive's Wayback Machine and assembled them using common web conventions. A live version and the source code are available online (cf. footnote 5).

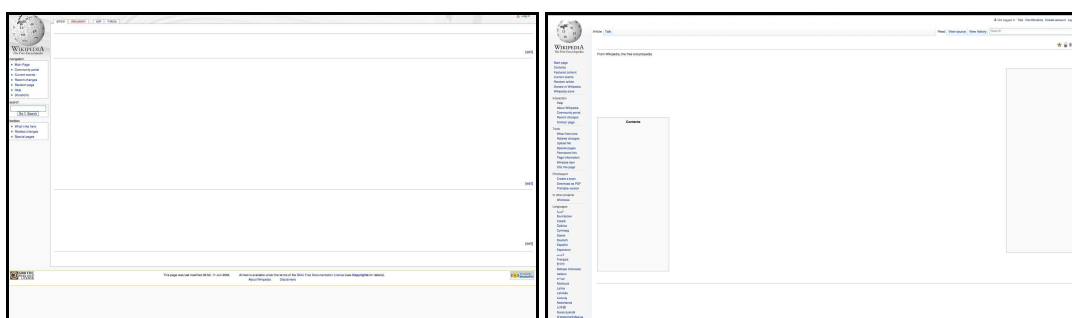


Fig 6 : Wikipedia template in early 2004 (left) and early 2016 (right)

Figure 6 shows Mediawiki predefined template for an article. It is possible to appreciate that large empty spaces are dedicated to the content, while panes and lateral menus are dedicated to options and actions.

<sup>10</sup> [http://ereyes.github.io/Mapping-Interface-Politics/mediawiki\\_viz/web/03-exploring-evolution.html](http://ereyes.github.io/Mapping-Interface-Politics/mediawiki_viz/web/03-exploring-evolution.html)

Among the main differences between versions, we believe it is important to mention:

- Categorisations in the left panel: earlier links have been reorganized into several categories, and a lot of new links have been added through the years mainly because of the implementation of new features on the platform,
- Upper right menu: “View source” and “View history” article tabs appear just below log-in options. Perhaps with the intention is to bring them together with the search field, a very common feature used by visitors.
- “Discussion” page has been renamed “Talk” page, possibly trying to appeal for politeness and guidelines of talk pages.

A first conclusive intuition would point to the fact that “View source” and “View history” are more relevant to potential contributors, so the options for them to log-in and review their contribution activity appear closer, ready-to-hand or simply to recall these possibilities.

## **II) Qualitative grid analysis to approach the degree of transparency in the Wikipedia interface**

We have arranged a qualitative grid analysis for the Wikipedia interface that might be used to do comparisons in future cases. Composed of twenty-seven criteria, the aim of our grid is to make an approach to the degree of transparency or opacity in three particular components : the editorial process and governance seen from the interface (10 criteria); Wikipedia graphical interface (10 criteria); and, Mediawiki features casted in the interface (7 criteria). The criteria regarding interface have been identified thanks to existing user experience grid analysis (Nielsen & Molich, 1990; Bastien & Scapin, 1993), the other criteria come directly from website observation. We applied this grid to 4chan’s Wikipedia article and detailed results can be found online<sup>11</sup>. A synthesis of the evaluation has been created below as data visualization.

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<sup>11</sup> [http://ereyes.github.io/Mapping-Interface-Politics/mediawiki\\_analysis/Wikipedia\\_Grid\\_Analysis/Sheet1.html](http://ereyes.github.io/Mapping-Interface-Politics/mediawiki_analysis/Wikipedia_Grid_Analysis/Sheet1.html)





*Fig 7 : Wikipedia Transparency Analytics.  
 Each bubble is a qualitative criteria improving the transparency of the platform.  
 The more the criteria is qualitatively good the more the bubble is big  
 Visualization made with raw tool<sup>12</sup>.*

According to our findings, we consider Wikipedia a good place for studying interface transparency because the system is exhaustive and well documented. Most of our criteria return positive remarks (green bubbles), showing that Wikipedia is a self-aware interface revealing its construction and giving insights about the way content is added (information about consensus work, argument bias, talk and history page) and the way the software is run and maintained (source code, technology used, archiving system). Most of the elements that improve interface transparency are situated in the header, the footer and the left menu of the article interface : the read, its history, talk, and source code pages.

In red bubbles, we see two interface issues: “error protection” - avoid errors from the user - and “immediate feedbacks”. These issues are expected increasingly in web interfaces since 2005 (the rise of "Web 2.0" era). However, in Wikipedia, we qualify a low usage of immediate feedbacks because they are not really seen by common readers, but rather by editors processing data entries.

If we follow the interface criteria in Figure 7, interface transparency is defined as an exercise in clarity, readability, simplicity, freedom and flexibility. As Bolter & Gromala noted, the myth of transparency is to make the interface invisible, it is a cultural choice made by early GUI designers but other choices can be made: “As designers, we want the interface to disappear for the user for part of the time, but not completely and not irrevocably.”<sup>13</sup>. Rather than believing in the total disappearance of the interface, another way to procede might be to

<sup>12</sup><http://raw.densitydesign.org>  
<sup>13</sup> p53

confront the user against the interface components; it is another “strategy of getting the user to look *at* the interface or object of design rather than *through* it”<sup>14</sup> (Bolter & Gromala, 2003). Can we think about self-reflexive interfaces with no intention to be forgotten but to reveal themselves?

## WIKIPEDIA INTERFACE IN THE ARCHAEOLOGY OF TRANSPARENCY

### I) Network of Wikipedia features linked to heterogeneous entities of the archaeology of transparency

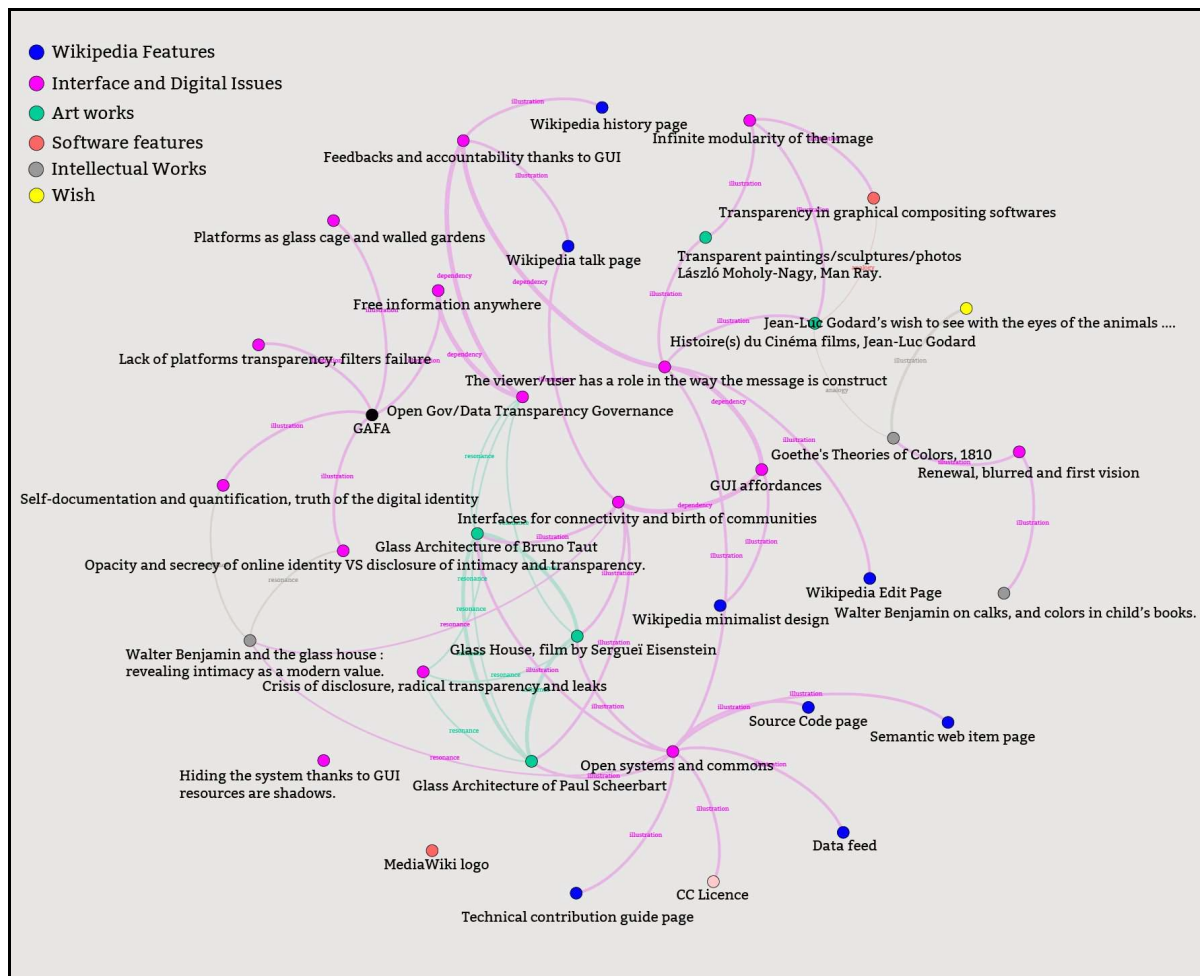


Fig 8 : Archaeology of transparency network. Entities are: artwork, intellectual works, artists, and software features that constitute the references to the archaeology of transparency. Wikipedia features are in blue. Network create using Gephi software<sup>15</sup>

This graph in figure 8 depicts a larger view of our project on genealogies of forms and meanings of transparency, it is an attempt to materialize our bibliographic study on the cultural history of the transparency notion. The ambition is to map in which contexts - periods, fields, actors - the moralization and politicization of transparency and opacity emerged. Such graph has to be seen as a “hypothesis generator” of the relation types between

14 p56

15 <https://gephi.org>

the archaeology entities : analogies, effect of resonances, illustration of an idea or issue, effects of influence, dependency between two entities.

All these relations are materialized by links whereas the nodes are entities such as Wikipedia features, interface and digital issues, art works, software features, intellectual works and companies. The table below shows how Wikipedia pages are linked to particular entities of the archaeology of transparency.

Broad digital issues	Interface issues	Wikipedia entities linked to the interface issues	Cultural entities linked to the interface issues
Open Government, transparency governance	Open systems and commons	Source Code page	Glass Architecture of Paul Scheerbart <sup>16</sup> , Glass House film by Sergueï Eisenstein <sup>17</sup> , Glass Architecture of Bruno Taut, Walter Benjamin and the glass house : revealing intimacy as a modern value <sup>18</sup> .
		Data Feed	
		Technical Contribution Guide	
		Semantic web item	
	Feedbacks and accountability thanks to GUI	Wikipedia history page	/
		Wikipedia talk page	
	GUI affordances	Wikipedia minimalist design	/
	The viewer/user has a role in the way the message is constructed	Wikipedia edit page	Histoire(s) du Cinéma films, Jean-Luc Godard, Transparent paintings/sculptures/photos László Moholy-Nagy, Man Ray <sup>19</sup> .

Table 1: Wikipedia entities linked to interface issues.

This table, outcome of the network, helps speculating about why two entities - a Wikipedia feature and another one - are both linked to the same interface issue. It is in fact possible to see that the first row of the “Cultural entities” column - all the glass houses projects - are linked to the “Open systems and commons” issue, such as several Mediawiki features. As you will see, analogies between forms of transparency across the cultural history starts to appear.

<sup>16</sup> SCHEERBART, P. (1914). *The Gray Cloth: Paul Scheerbart's Novel on Glass Architecture*. MIT Press, 2001 (first published in 1914).

<sup>17</sup> LAUMONIER, A. (2009). *Glass House – Du projet de film au film comme projet*. S. M. Eisenstein, Presses du réel.

<sup>18</sup> BENJAMIN, W. (1931-1934). “Experience and Poverty” in *Walter Benjamin: Selected Writings, Volume 2: Part 2. 1931-1934*. Series edited by Michael W. Jennings, Gary Smith, Howard Eiland. Harvard University Press, 2005.

<sup>19</sup> BOTAR, O. (2014). *Sensing the Future: Moholy-Nagy, Media and the Arts*, Lars Müller Publishers.

During the *avant-garde* period, architects wanted to built transparent spaces; glass buildings were the new infrastructure of a new kind of “organic community” : the “glass civilization” (Paul Scheerbart, 1914). In visual art, the concept was used to create new types of optic situations (László Moholy-Nagy, Marcel Duchamp, Man Ray, Sergueï Eisenstein, Dziga Vertov) or to mix different temporalities and references into a single image (Jean-Luc Godard). Our intuition is that *avant-garde* artists dealt with the same issues we are dealing with today - information transparency, community building with open systems, autonomy of the user/viewer, privacy) and maybe they already gave some responses and strategies to adopt in order to face these issues.

This graph invites us to go back and forth inside our bibliography, to formulate our intuitions and to improve our understandings of interface politics. In this manner, Wikipedia features are recontextualised within the archaeology of transparency and connected to contemporary interface issues.

## CONCLUSION

We have presented an approach to map transparency issues in design and technology: the archaeological inquiry shows that Wikipedia as software and interface could be seen as a new instance of a long history of endeavors to create open and transparent collaborative systems. The grid analysis tells us that Wikipedia interface reveals itself thanks to an almost exhaustive description of Wikipedia governance (links in header, footer and left menu). To deepen the analysis, it would be necessary to analyse also the degree of transparency of the whole links in a Wikipedia page (news, articles, reports...) and to think about the level of trust on editors.

From the software point of view, we saw that it is not so easy to contribute to the code as compared to the content of articles, even if we can have some metrics about code maintenance and complexity. It also appears that massive efforts done by Wikipedians technical contributors are done for the creation of tools for editors and not for everyday readers of the encyclopedia.

It is interesting to note that all these results point to the fact that an interface cannot be transparent if the governance and the organisation that runs the interface is not transparent itself. Moreover, the success of a transparent interface is clearly linked to the degree of openness of the organisation designing it. To avoid openness and transparency euphoria in the current digital world, we have to redefine what kind of openness we want for our technical systems and when transparency needs to move from a "matter of concern" to a "matter of care" (Puig de la Bellacasa, 2011).

The difficulty we are facing is that it is not enough to advocate transparency because open systems like Wikipedia create new forms of opacity and closure in the collaborative process (elections of administrators and technical contributors for example). As Nathaniel Tkacz argued in his book *Wikipedia and the Politics of Openness*: “there is something about openness, about the mobilization of the open and its conceptual allies, that actively works against making these closures visible.”<sup>20</sup> One reason of these invisible closure is the complexity and mixity of social, political, and technical decisions. The boundaries and interface effects among them are blurry. In this paper, we developed experimental proposals to identify transparency issues in the complexity of wikipedia layers.

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