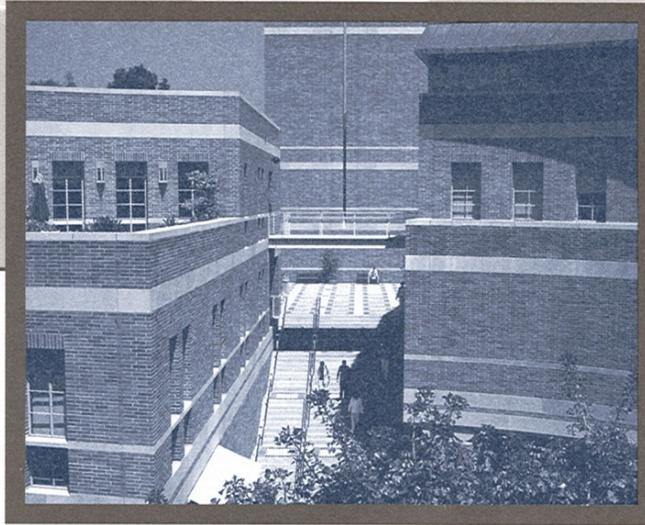


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**WEB 2.0 ACCORDING TO WIKIPEDIA:  
CAPTURING AN ORGANIZING VISION**

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# **Web 2.0 According to Wikipedia: Capturing an Organizing Vision<sup>1</sup>**

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<sup>1</sup> Earlier reports on this research were presented at the OASIS IFIP WG8.2 Workshop, Paris, December 13, 2008, and Wikisym, October 25-27, 2009, Orlando.

# Web 2.0 According to Wikipedia: Capturing an Organizing Vision

## Abstract

Is Web 2.0 more than a buzzword? Over recent years, technologists and others heatedly debated this question, even in Wikipedia, itself arguably an example of Web 2.0. From the perspective of the present study, Web 2.0 may indeed be a buzzword, but more substantially it is also an example of an *organizing vision* that drives a community's discourse about certain new IT, serving to advance the technology's adoption and diffusion. Every organizing vision has a career which reflects its construction over time, and in the present study we examine Web 2.0's career as captured in its Wikipedia entry over a five year period, finding that it falls into three distinct periods termed Germination, Growth, and Maturation. The findings reveal how Wikipedia, as a discourse vehicle, treats new IT and its many buzzwords, and more broadly captures the careers of their organizing visions. Too, they further our understanding of Wikipedia as an encyclopedia, providing novel insights into its community of contributors and their editing activities, as well as the dynamics of article construction.

"It's always difficult to get past technology buzzwords [Web 2.0]. Even when the subject holds real merit, the hype machines quickly throw the subject out of whack, making it difficult to distinguish between the fad and the original promise. Public relations professionals, anxious to link their new product to a "hot new technology," appropriate the term even when it doesn't actually apply. Industry articles claim that the new buzzword-enabled technology will forever change the face of computing. You begin to expect to hear that a woman has named her baby after it, and that, at the end of the cycle, the technology will be blamed for global warming."

~ Esther Schindler, *Web 2.0 Definition and Solution*, *CIO Magazine*, April 2, 2007

## **Introduction**

What is Web 2.0 really? Over recent years, technologists and business people heatedly debated this question. Seemingly at stake was the future of the Web, arguably the most important innovation since the Internet itself. But was a new version of the Web really in play or was the "2.0" term a mere marketing ploy on the part of those pushing IT product and services? Sir Tim Berners-Lee, the Web's inventor, was unimpressed, famously commenting, "I think Web 2.0 is, of course, a piece of jargon, nobody even knows what it means." Not without irony, this dismissive remark was soon documented in Wikipedia's encyclopedic entry on Web 2.0, which had first appeared some months earlier on February 28, 2005. Wikipedia is of course a cited instantiation of Web 2.0. Now, today, evidently, Web 2.0 is still received as more something than nothing, as its Wikipedia entry persists, amounting to more than 4,400 words. On the other hand, Web 2.0 is now also classified by Wikipedia as a buzzword. Whoops! Should we thus still not take it seriously?

We count ourselves among those who take certain IT buzzwords, Web 2.0 among them, seriously. We are not alone. It may be observed that business people and professionals constantly struggle to make sense of new IT and its many buzzwords. In the introductory passage pertaining to Web 2.0, quoted above, Esther Schindler remarkably captures the challenges faced in interpreting the sometimes contradictory discourse that accompanies much new IT. We take this discourse to be consequential. From our own perspective, Web 2.0 may indeed be a buzzword, but

more substantially it is also an example of what Swanson and Ramiller (1997) call an *organizing vision*, a “focal community idea for the application of IT in organizations” (p.460). Organizing visions are viewed as both products of the community’s discourse and fundamental drivers of IT innovation diffusion and adoption. They serve three main functions: to interpret an innovation by identifying its purpose and meaning; to legitimate it as serving appropriately the needs of organizations; and to mobilize actors and their resources for its adoption, implementation and use (Swanson and Ramiller 1997). Apart from Web 2.0, other recent examples include Customer Relationship Management (CRM), Service Oriented Architecture (SOA), and Cloud Computing.

In promoting an IT innovation, then, interested parties collectively create, develop and diffuse the associated organizing vision. As discursive constructions, organizing visions are captured by and propagated through a wide range of *discourse vehicles* (Ramiller and Swanson 2003), defined as means through which actors produce, disseminate, and receive texts (Wang and Swanson 2008). Books, periodicals, meetings, conferences, and online media such as Wikis and blogs are examples. In the present context, we shall be interested in Wikipedia as a discourse vehicle for capturing and propagating Web 2.0 as an organizing vision. Drawing from Wikipedia’s own data resources, we undertake an exploratory case study of its Web 2.0 entry, and its construction and evolution over the five years since the article’s origin. Given our interests, we seek process and structural insights more than a resolution of the debate over the content and meaning of Web 2.0. We provide more background and motivation for the study next.

### **Research Background**

One important aspect of organizing visions is that they have *careers* (Ramiller and Swanson 2003) which reflect their construction, elaboration and refinement by their communities over time, and also their effectiveness in fulfilling their interpretive, legitimizing, and mobilizing functions.

The career of an organizing vision can be pictured as having a characteristic arc, first ascendant as the vision gains notice and the community's discourse intensifies, then descendant once interest falls off, either because the innovation disappoints and fails to widely diffuse, or because it becomes widely accepted and taken for granted in practice (Ramiller and Swanson 2003). Very few empirical studies have explored the careers of organizing visions, however, and our understanding of their developmental paths and how they are influenced is still very limited. In their study of the launch of Professional Services Automation (PSA), Wang and Swanson (2007) found, for instance, that lack of coherence in the organizing vision for this innovation contributed to the failure of its broad adoption. In their study of how the advertising section of *Business Week* promulgated Customer Relationship Management (CRM) over 5 years, Wang and Swanson (2008) found that the innovation's organization vision was kept "lively" by advertising contributors who recurrently produced fresh meanings to the innovation to advance its progress. In another study, Schultze (2007) traced the career of Knowledge Management (KM), showing how the associated discourse evolved through distinct phases, concluding that at that time, the career of KM was still maturing, and that the term's definitional ambiguity made KM's future unpredictable. More broadly, the difficulty in understanding the careers of organizing visions is compounded by the fact that visions are propagated through a wide variety of vehicles. Each discourse vehicle captures an organizing vision in a very specific way, and the vision's career may be reflected differently from one vehicle to another.

However challenging, the study of careers of organizing visions is critical to our understanding of how the institutional environment shapes the diffusion and adoption of IT innovations. In the present research, we contribute to this endeavor, choosing to examine the career of Web 2.0 in Wikipedia, as captured by the history of the discourse devoted to the term in

the online encyclopedia. Under the label Web 2.0 fall a host of related innovations such as social-networking, blogs, folksonomies and wikis such as Wikipedia. As a buzzword, Web 2.0 became hugely popular subsequent to the first O'Reilly Media Web 2.0 conference in 2004, and notwithstanding the debate that surrounded it, the term has since become a part of the everyday discourse of a broad community, including technologists, business persons, policy makers, consultants, media professionals, and academics. Indeed, the "2.0" portion of the term is now something of a cliché in popular discourse, applied to all manner of things and their evolution.

Our choice of Wikipedia as the discourse vehicle with which to study the evolution of Web 2.0 was not fortuitous. Beyond the irony of Wikipedia being an instance of "Web 2.0," the main driving force behind our choice was our curiosity as to how Wikipedia, one of the largest reference sites today, operates as a discourse builder and propagator for IT buzzwords more broadly.

Remarkably, in less than a decade of existence, Wikipedia, "the free encyclopedia that anyone can edit," has become a formidably dynamic and popular global discourse vehicle. As the largest online reference site, Wikipedia parades today among Google, Facebook, Yahoo!, and YouTube as one of the most visited websites on earth.<sup>2</sup> Most IT innovations, past and present, have found a place in the online encyclopedia. For instance, the first entry in Wikipedia for "Internet" was made in January 2003, the entry for "Virtualization" in May 2009. Wikipedia is not just a novel discourse vehicle; it also differs from other vehicles in several ways. First, the discourse about any topic in Wikipedia is the result of the collaborative efforts of thousands of volunteers from around the world, and reflects the voices and the consensus of a very large and diverse community. Anyone with Web access can indeed contribute to the online encyclopedia, by simply clicking on the "edit this page" link. Second, the discourse in Wikipedia is in constant evolution, in

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<sup>2</sup> [www.alexa.com](http://www.alexa.com), ranking based on traffic

tune with our constantly changing environment and evolving state of knowledge. Third, Wikipedia is an encyclopedia, and its content is governed by strict rules captured by three core policies. The first policy, Neutral Point of View (NPV), states that Wikipedia articles must represent significant views fairly, proportionately and without bias. The second policy, No Original Research (NOR), specifies that Wikipedia does not publishes original research or original thoughts, in other words all material in Wikipedia must be attributable to a reliable, published source. The third policy, Verifiability, states that all references and quotations must be attributed to a reliable, published source.

Finally, Wikipedia's uniqueness also lies in the fact that it systematically keeps a detailed record of the developmental history of its content. Every single change made to a page is recorded, together with who performed the changes and when they were made. In line with its "open" philosophy, this history is further made available to all and intensive research on Wikipedia making use of this data is accordingly underway. Much of the research is interdisciplinary, attracting researchers from areas such as Computer Science, Sociology, Education and Linguistics, for instance. Most has been performed at a macro level, objects of study being the entire Wikipedia English edition, for instance, rather than individual articles (see for instance Ortega and Gonzalez-Barahona 2007 and 2008; Kittur et al. 2007). Among the questions asked, for example, is whether Wikipedia's stunning growth is sustainable. Spinellis and Louridas (2008) conclude that it largely is, finding from an analysis of Wikipedia's network structure among linked articles, that Wikipedia's growth is scale-free, much like that of the Internet itself. As to our own interests, we are aware of no prior research that has examined Wikipedia in the context of discourse vehicles employed through their articles to advance the diffusion of IT innovations in the economy more broadly.

We observe that in constructing the discourse about an IT innovation in Wikipedia, contributors have several tools at their disposal. The first is the article itself, the collective written representation of the ongoing discourse about the innovation in the broader community. Articles in Wikipedia are “edited” by their contributors who build on the work of one another, adding, removing, or rearranging content as they come and go. A second tool, references, legitimates the content of articles, ensuring that what is being written is verifiable and accurate, according to Wikipedia’s core policy. A third tool, the Talk pages, provides a place for contributors to discuss and argue ideas, resolve disagreements, etc., and plays an important role in shaping the narrative. A fourth tool, Wikipedia links, can be used to link articles among each other within Wikipedia, a feature which can be used to extend an article by linking to new ones that elaborate on a sub-topic, for instance.

As we shall see, the present study proves to be revealing in several ways. First, we were able to unravel the career path of Web 2.0 as captured by the online encyclopedia, suggesting a three-phase model that describes the vision’s evolution over time within the article. We were also able to reveal some of the unique features of Wikipedia as a discourse vehicle. Finally, our detailed study of how the Web 2.0 article was built provided new insights into the Wikipedia community’s roles and behaviors and the dynamics of article building.

## **Methods**

We employed a variety of mostly ad hoc methods.<sup>3</sup> To explore the career of Web 2.0 via Wikipedia, we examined the evolution of the Web 2.0 entry in Wikipedia over 5 years, from the first entry in February 2005 through January 2010, importing the page edits history for these 5

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<sup>3</sup> We note that some researchers have developed visualization tools to represent the evolution over time of the content and editing activities of Wikipedia articles and the activity patterns of certain authors (Viégas et al. 2007). Most of these tools were not suited to our own study and we thus relied on our own ad hoc methods.

years from Wikipedia, downloading it as an XML file and then importing it into Excel for analysis. The article revisions history provided key information about each edit: when it was made (timestamp), who made it (username or IP address), a short summary describing the modification performed if any, and the content of the page format in textual form. Analysis of this data was simple but tedious, and consisted of examining each edit individually to classify them according to specific types, to identify the various type of contributors (administrators, bots, registered or unregistered users), calculating the size (number of characters) of each entry, and developing other useful metrics, such as the number of characters added or subtracted, the time interval between two consecutive edits, etc. Analysis of the actual content of the article was limited to its structure (number of headings and sub-headings) and how references were used. We analyzed references to external sources, but not internal links to other Wikipedia pages. For each edit, we extracted from the body text the links to sources listed either in the “References” or “External links” sections. The extraction process was automated using small macros developed in Visual Basic for Excel.

To gain deeper insight into the dynamics of the article’s construction, we also examined the Talk pages. These pages allowed us to peek at the debates, sometimes raging, that went on behind the scene over how to define Web 2.0, what references should be used to support its definition, and its origin to mention but a few. We downloaded the Talk pages revision history as an XML file and imported it into Excel for analysis. It provided data similar to that of the main article: who participated in the discussions and when, together with the subject and content of the contributions to the discussions.

To situate the evolution of Wikipedia’s Web 2.0 article in the broader context of discourse on Web 2.0, we further gathered data from other sources. We searched the business articles database

EBSCO<sup>4</sup> for articles containing the term “Web 2.0” either in the title or in the body text. The search was performed for the time period corresponding to the first 5 years of the Web 2.0 article’s life, and also for the months that preceded the article’s first entry in Wikipedia. To gain further insight, we used data provided by Google Trends<sup>5</sup> about the search trends for the term “Web 2.0.” Google Trends uses a portion of Google Web searches to compute how many searches have been done for a particular term, relative to the total number of searches done on Google over time. Results are available from Google in the form of a graph and weekly hard data. We also sought to investigate the popularity of the Web 2.0 Wikipedia page itself. Data on this measure, however, were hard to come by, and we were only able to obtain the daily page views for the Wikipedia Web 2.0 page from August 2008<sup>6</sup> from an application developed by a Swedish Wikipedia administrator, which analyses and visualizes the page view statistics of Wikipedia articles from Wikipedia's squid cluster.

Finally, we investigated in more depth the most prolific contributors to Wikipedia’s Web 2.0 article. We sought to learn more about these individuals and their backgrounds, so as to better understand this small but important subset of the Wikipedia Web 2.0 community. Many, but not all registered users have profile pages in Wikipedia, which proved to be good sources. When this data was limited or not available, we used Google to search registered users’ usernames to discover more. This approach was fruitful and we were able to gain further data on these more discrete contributors. In all, we collected data on contributors’ countries of origins, their professional affiliations, and their levels of involvement in Wikipedia as whole and relative to the Web 2.0 page, for instance.

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<sup>4</sup> EBSCO (Business Source Complete) is a comprehensive business articles database covering more than 8,500 scholarly, professional, and trade periodicals in all areas of business.

<sup>5</sup> [www.google.com/trends](http://www.google.com/trends)

<sup>6</sup> <http://stats.grok.se/>

## Analyses and Findings

With our data in hand and metrics defined as just described, we undertook a series of analyses which we present next, along with our findings. We describe the Web 2.0 Wikipedia article and its evolution over five years, and then examine the community that built it and how it used the various discursive tools at its disposal. To provide context, we first present a broader sketch of Web 2.0's career path over the same period, drawing from other independent sources.

### Web 2.0 in context

To better understand and explain the evolution of the Web 2.0 article in Wikipedia, we first sought to assess Web 2.0's career path more broadly. Figure 1 below shows the evolution of the Google search trends for Web 2.0, the number of articles in EBSCO containing the term in the body text or title, and the number of times the Wikipedia Web 2.0 page was accessed during the 5<sup>th</sup> year of the article's life (limited data being available). All data but those for Google search trends were rescaled and normalized so all the curves could fit onto one graph.

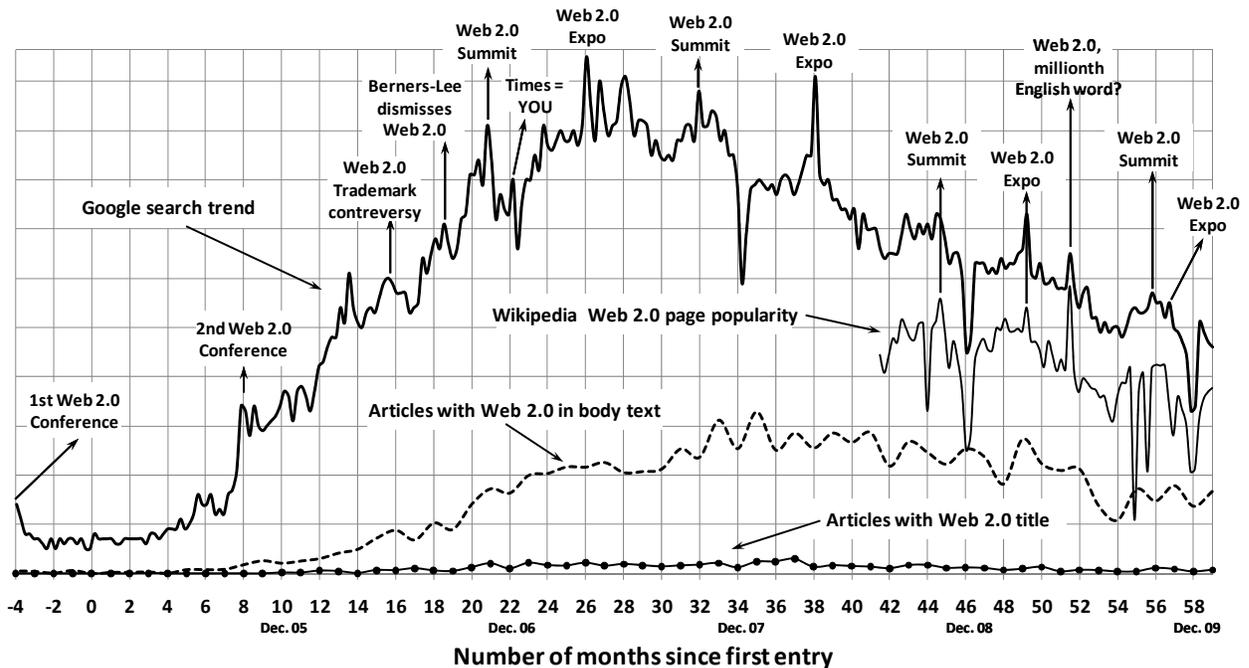


Figure 1. Popularity of the term Web 2.0 over time

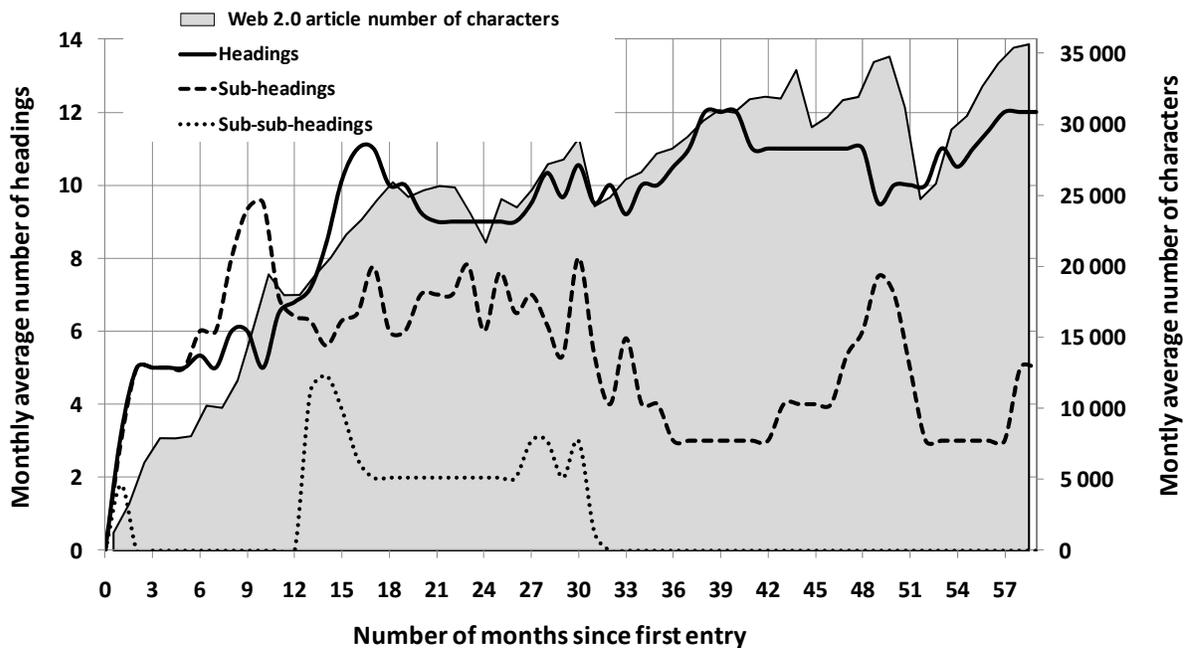
Overall, Figure 1 suggests that the term Web 2.0 went through an initial period of indifference or unawareness, followed by a rise then gradual decline in popularity. A closer look provides additional insights. We see, for instance, that the first small peak in Google searches (-4 months on the graph) coincides with the first Web 2.0 conference which took place in San Francisco in October 2004. If interest in the term was triggered then, it was only temporary, however, as the term received no or very little general and media attention for another 8-10 months. After this initial period, Google searches and article publications took off, showing remarkable growth before leveling off some two-plus years later. The popularity of the term then seemed to fade, and it is interesting to note that public interest decreased well before (about 6 to 8 months) the media's loss of attention to the term, suggesting that publications may lag (feeding off) rather than lead public interest.

Google search trends for Web 2.0 were punctuated by intriguing peaks and troughs we investigated further. We found that troughs corresponded to a search decrease during the Winter and Summer holiday breaks. We were able to associate most of the search peaks with specific events, in particular the Web 2.0 conferences (Summit and Expo) that took place at regular intervals over the years. Other search peaks coincided with the publication of articles mentioning Web 2.0 in a major magazine or newspaper, or with the publication of comments about the term by personalities (see Appendix A for details).

Finally, we note that the evolution of the popularity of the Wikipedia Web 2.0 page followed very closely the evolution of Google searches for the term (see Figure 1). This is not surprising, given that in all likelihood individuals interested in knowing more about the term Web 2.0 may have first searched for it in Google, then clicked on the prominently listed result linking to Wikipedia's Web 2.0 page.

## The Web 2.0 article in Wikipedia

The first entry in Wikipedia for the term Web 2.0 was made February 28<sup>th</sup> 2005. Over the 1,793 days we studied, the Web 2.0 page was edited 5,970 times (an average of 3.3 edits a day), and its content grew from a small entry containing 640 characters to a fully developed page containing over 36,000 characters (at the end of January 2010). Its growth is shown in Figure 2. During these 5 years, contributors added 4,504,641 characters and removed 4,468,891 in total for a net difference of 37,750. The article grew very rapidly in size during the first 18 months of its life, and at a much slower pace thereafter, seemingly reaching a plateau during its 5<sup>th</sup> year of existence.



**Figure 2. Growth of Web 2.0 article in Wikipedia**

As the article grew in size, its contributors also strived to organize its content, and the structure of the article (as seen through the combinations of headings and sub-headings) evolved accordingly over the years. During the first 6 months, contributors rapidly organized the content of the article into a simple and stable structure, using a handful of headings and sub-headings. The structure then grew more complex, incorporating a third level of headings. This structure lasted for

two years before giving way to a simpler one, which eliminated the third level of headings and halved the number of sub-headings.

The content of the Web 2.0 article grew from the editing activities of its contributors, not all of whom came with the same purpose, however. Some came with the legitimate intent of adding new content to the article; others came with malicious intentions, sabotaging or vandalizing the community's work. Some just came by curiosity to try things out; others came to challenge existing contributions or ideas. Each could add and/or remove content by simply clicking on the "Edit this page" button. There is also the option to restore a page to a previous version, undoing the effects of one or several edits. These types of edits, labeled "revert" edits in Wikipedia, are often used to deal with vandalism, or to challenge some contributors' edits. "Revert" edits restore a page to a previous state, eliminating in the process anything constructive that may have been performed in between. To avoid this, contributors can also "undo" one or more edits by selectively eliminating specific editing actions. These edits are labeled "undo" in Wikipedia.

To reflect the contributors' purposes in their editing activities we categorized the various types of edits that made up the content of the Web 2.0 article. Some of the categories we used already formally existed in the Wikipedia glossary, such as vandalism, spam, and copy edit. Others were created for the purpose of this study, complementing the existing Wikipedia glossary. Together, the categories were treated as mutually exclusive and exhaustive. They are shown in Table 1 below.

<b>Edit types</b>	<b>Number of edits</b>	<b>Wikipedia / Own categories</b>
<b>Spam</b>	132 (2.2%)	Wikipedia category: "...advertisements masquerading as articles and external link spamming." <sup>7</sup>
<b>Test</b>	252 (4.2%)	Own category (edits performed and immediately removed by same contributor)
<b>Maintenance</b>	301 (5%)	Own category
<b>Copy edit</b>	740 (7.4%)	Wikipedia category - Copy-editing guidelines are part of the English Wikipedia's Manual of Style <sup>8</sup>
<b>Challenge</b>	731 (12.2%)	Own category (all revert or undo edits, except those dealing with vandalism or spam)
<b>Restoration</b>	800 (13.4%)	Own category (includes all edits that undo or revert vandalism or spam)
<b>Vandalism</b>	803 (13.5%)	Wikipedia category: "Any addition, removal, or change of content made in a <i>deliberate</i> attempt to compromise the integrity of Wikipedia." <sup>9</sup>
<b>Challenged</b>	957 (16%)	Own category (includes all reverted and undone edits)
<b>Unchallenged</b>	1,555 (26%)	Own definition (edits not categorized above)
<b>Grand Total</b>	<b>5,970 (100%)</b>	

**Table 1. Types of edits performed to the Web 2.0 article**

Together vandalism and spam represented 15.7% of all edits to the page. Clean-up of either type was categorized as "restoration" edits, some of which cleaned up multiple vandalism or spam attempts. All substantive (non-spam and non-vandalism) edits that were "reverted" or "undone" were categorized as "challenged" edits, while those that reverted or undid them were categorized as "challenge" edits, some of which reverted several "challenged" ones. In most cases (94.3%), pairs of "challenged" and "challenge" were contiguous or separated by one edit. The remaining pairs of edits were not separated by more than 10 edits. "Challenge" and "challenged" edits represent 28.2% of all edits performed to the article, and reflect in part the tensions among the contributors in constructing the content of the Web 2.0 article.

"Unchallenged" edits refer to those substantive edits that were not challenged by either a "revert" or an "undo" action. These edits are important because they were not dismissed immediately, and as such formed a stable fabric upon which further content could be built.

<sup>7</sup> <http://en.wikipedia.org/wiki/Wikipedia:Spam>

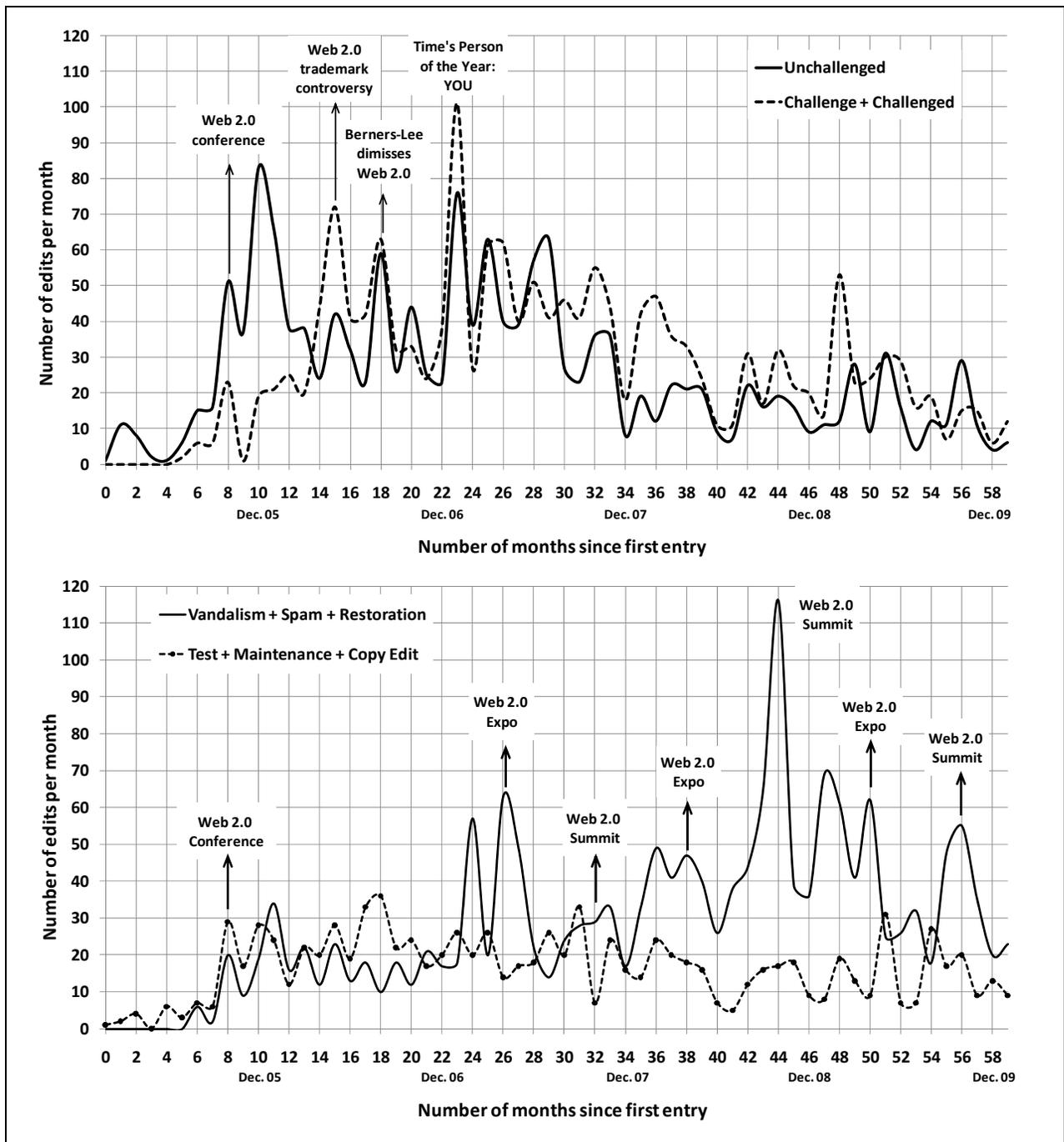
<sup>8</sup> [http://en.wikipedia.org/wiki/Wikipedia:How\\_to\\_copy-edit](http://en.wikipedia.org/wiki/Wikipedia:How_to_copy-edit)

<sup>9</sup> [http://en.wikipedia.org/wiki/Revert\\_vandalism](http://en.wikipedia.org/wiki/Revert_vandalism)

“Unchallenged” edits represent the most frequent of the Web 2.0 article contributors’ activities (26% of all edits).

Lastly, “maintenance” edits are edits that insured the validity and integrity of external and internal links, perform disambiguation, etc., while “copy edits” are minor edits that fixed grammatical and typographical errors. These edit types essentially reflect the attention paid to the quality of the article, according to Wikipedia standards and core policies. At times, some contributors edited the page, then immediately deleted their contribution in a consecutive entry. These edits were categorized as “test” edits. All together, “test”, “maintenance” and “copy” edits represent 16.6% of all edits.

As the article evolved, so did the combinations of edit types performed, as shown in Figure 3. The first year of the article’s existence saw little controversy about its content, as the small number of “challenge” and “challenged” edits suggests. During this period most edits were of the “unchallenged” type, building the core content of the article. Real attention to the quality of the article, as expressed by the number of “maintenance” and “copy” edits, started 6 months after the first entry, probably triggered by a burst of “unchallenged” edits during this period, and by increasing visibility of the article. There was also very little vandalism and spam during the first 6 months of the article’s life, but as the popularity of the term increased, so did these editing activities. We could attribute many of the vandalism peaks to an increase in the level of interest in the term triggered by the annual Web 2.0 Summit and Expo conferences (see Figure 3).



**Figure 3. Evolution of types of edits with time**

In all, the Web 2.0 article grew in a complex manner. Leaving aside the inevitable vandalism and spam, the evolution of the combinations of different types of edits revealed interesting patterns which we will discuss further later.

Our attention now turns to the individuals who contributed to the article, and we explore next who they were and what they did.

### **The contributor community**

In this study, we focus on a subset of the broad community that shaped the discourse about Web 2.0: those who contributed to the Web 2.0 article in Wikipedia. As we shall see, this community was rather ephemeral, involving different types of contributors who, over the course of the first 5 years of the article’s life, participated to very different extents and at very different times in the article’s construction.

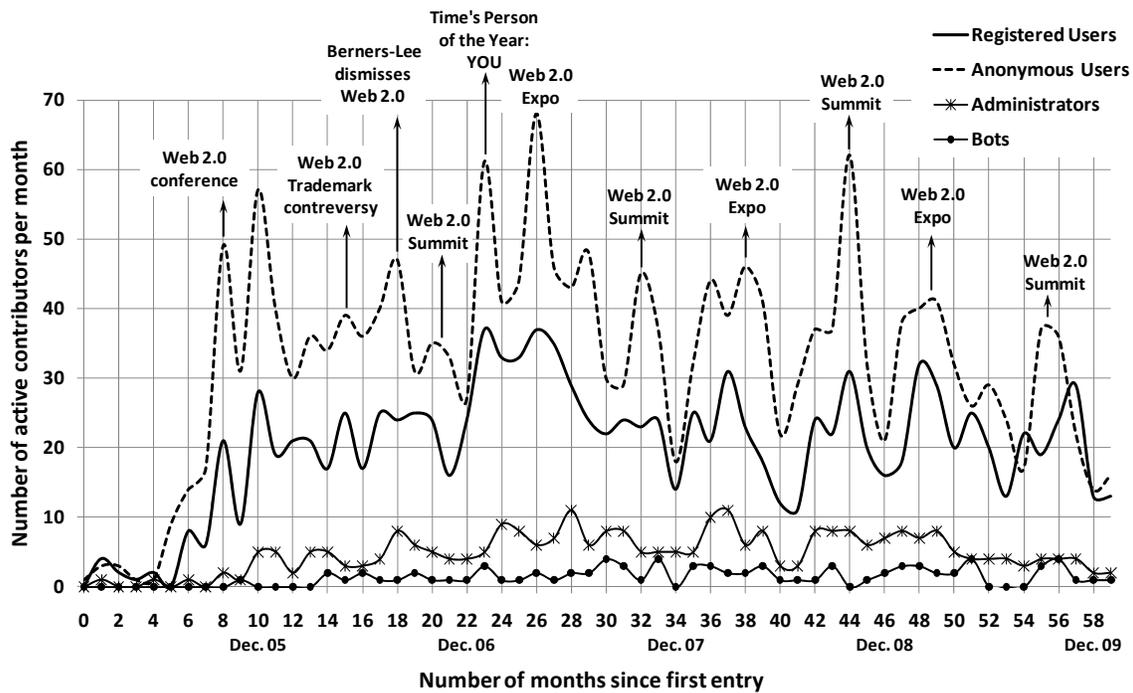
Over our period of study, 2,956 users contributed to the article. Table 2 provides details. Anonymous users, those unregistered users only identifiable by their IP addresses, represented the largest group (1,892 in total). Registered users, those who set an account with Wikipedia, formed the second largest group (907), followed by administrators, elected registered users with special editing rights (127), and bots which perform automated tasks (30).

<b>User types</b>	<b>Number of contributors</b>	<b>Number of edits</b>	<b>Characters added</b>	<b>Characters subtracted</b>
<b>Anonymous users</b>	1,892 (64%)	2,830 (47.4%)	385,876 (8.6%)	4,114,462 (91.3%)
<b>Registered users</b>	907 (30.7%)	2,390 (40%)	1,598,367 (35.4%)	280,626 (6.3%)
<b>Administrators</b>	127 (4.3%)	609 (10.2%)	864,879 (19.2%)	71,642 (1.6%)
<b>Bots</b>	30 (1%)	80 (2.2%)	1,655,519 (36.8%)	2,231 (0.05%)
<b>Total</b>	<b>2,956 (100%)</b>	<b>5,970 (100%)</b>	<b>4,504,641 (100%)</b>	<b>4,468,891 (100%)</b>

**Table 2. Types of users contributing to the article**

Assessing the exact number of anonymous users posed a challenge because being unregistered they are only identifiable by their IP addresses. The same contributor may indeed use different IP addresses to contribute to the article, or a registered user may forget to logon to Wikipedia before editing the page. To mitigate this problem, we performed reversed IP location lookups for all unregistered IP addresses, which provided the country, state and city of origin of the

contributors' Internet connections, and the name of their Internet Service Provider (ISP). Our attempt proved to be inconclusive, however, as we could not differentiate among many users sharing the same city of origin and ISP. This analysis was not entirely wasteful, nevertheless, as we were able to learn that 72.8% of all unregistered users came from English speaking countries (44.7% from the U.S), and from 76 different countries in all, including Myanmar, Malta, Monaco, Japan, the Philippines and Bahrain to cite but a few.



**Figure 4. Types and number of active contributors over time**

In terms of number of edits, anonymous and registered users contributed the most and almost equally to the Web 2.0 article. Administrators and bots performed few edits in comparison. In terms of number of contributors, anonymous and registered users were both active from the article's inception, and the ratio of the former to the latter oscillated around 2 over the period of study, as shown in Figure 4. Administrators and bots became active later, 9 and 18 months after the first contribution, respectively. Both anonymous and registered users' contributions to the Web 2.0

page followed seasonal patterns, with lowered activity during the winter and summer holiday break periods.

Different types of users performed different types of edits. Not surprisingly, anonymous users were the biggest contributors of vandalism (93.5%) and spam (80%), which were restored mostly by registered users, and to some extent by administrators and bots. Anonymous and registered users were the biggest contributors of “unchallenged” edits, contributing almost equally (49% and 47.6% respectively). Anonymous users’ contributions were the most “challenged,” (73% compare to 25% for registered users). Those edits were challenged mostly by registered users (61.6%) and administrators (28.1%).

Contributor username	Administrator Y/N	First edit in Wikipedia	First Web 2.0 edit	Last Web 2.0 edit <sup>10</sup>	Number of edits					
					Total	Unchallenged	Challenge	Challenged	Copy edits	Restoration
<b>Artw</b>		10/04	1/06	10/09	216	39	89	15	22	38
<b>ZimZalaBim</b>	Y	6/04	8/06	6/09	145	12	65	2	6	59
<b>Sleepyhead81</b>		4/05	8/05	8/07	144	28	29	7	3	69
<b>Mindmatrix</b>	Y	12/04	4/06	1/10	87	3	21	0	5	57
<b>Beachy</b>		9/04	6/06	5/07	85	20	10	25	16	8
<b>Jehochman</b>	Y	3/05	9/07	8/09	78	24	9	3	21	5
<b>Aldaron</b>		12/05	11/06	8/09	75	18	17	2	8	24
<b>John Seward</b>		3/06	6/06	10/07	66	21	17	2	7	13
<b>Pkchan</b>		12/05	4/06	8/09	63	16	11	3	14	4
<b>Stephen B Streater</b>		2/06	2/06	2/08	55	16	6	3	20	6
<b>Octavabasso</b>		11/06	5/09	12/09	47	29	3	0	10	3
<b>Nigelj</b>		8/04	11/05	11/09	38	13	2	2	10	4
<b>GraemeL</b>	Y	8/05	1/06	11/08	31	1	18	2	2	7
<b>Ohnoitsjamie</b>	Y	12/06	9/2006	11/2009	26	1	13	0	0	12
<b>Pedant17</b>		7/03	5/2006	1/2008	24	4	0	5	14	1
<b>Versageek</b>	Y	7/06	4/2008	12/2009	22	0	5	0	0	17

**Table 3. Major contributors (number of edits > 20) editing activities**

<sup>10</sup> As of the end of January 2010

We found the Wikipedia community contributing to the Web 2.0 article to be rather ephemeral: 69% of all contributors (2,041) contributed only once to the article, 29.5% (871) contributed 2 to 9 times, and a mere 1.5% (43 contributors: 25 registered users, 8 administrators, 6 anonymous users and 4 bots) 10 times and more. Edits made by the 33 main registered contributors (including administrators) accounted for almost 60% of all edits made by registered users. Activity profiles for those 16 registered contributors with twenty or more edits are shown in Table 3.

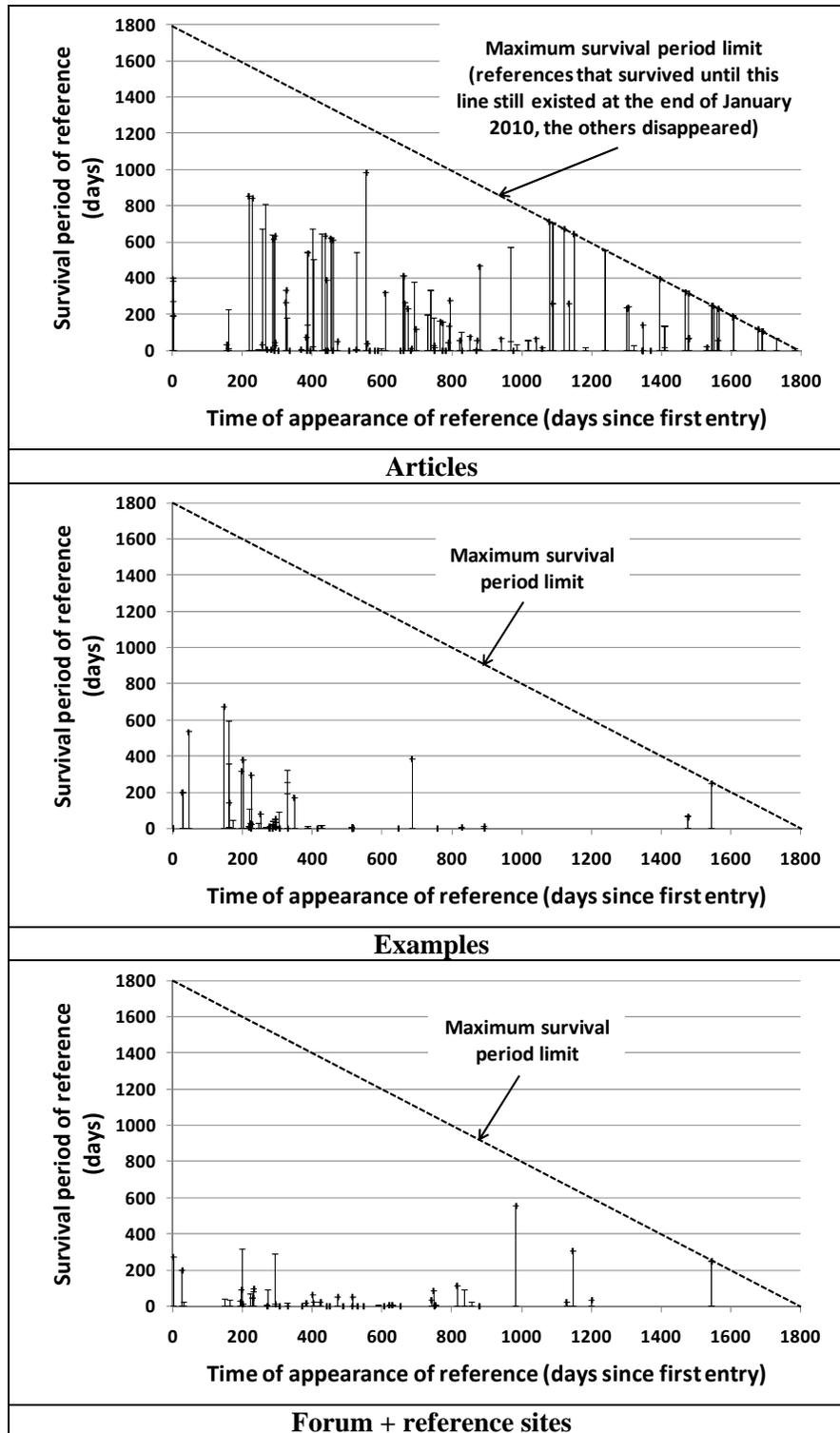
A closer look at major contributors revealed that all were associated in one way or another to the IT world: they were IT consultants, software, systems or web developers, CEOs or managers at high-tech. companies, etc. Most were from the US; other countries of origin included Canada, the UK, Spain, Norway, and Hong Kong. The most prolific contributor, with 216 edits, was a British writer and Web developer. All also edited other articles in Wikipedia, some very actively (six had performed over 10,000 edits over their careers in Wikipedia, which put them in the top 3,000 most active Wikipedia contributors on a number of edits basis). The Web 2.0 article was the main focus of about half of the major contributors; for others editing Web 2.0 represented a small part of their involvement in Wikipedia (the Web 2.0 article was not in the top 15 pages they edited). Half joined the Wikipedia community before the first Web 2.0 entry; the latest joined in August 2007. Major contributors were very little active during the first 6 months of the article's life (3 in all edited the page 25 times). They were most active during the 6-29 months period of the page's life, when they performed over 76% of all their edits, at an average of 34 edits per month.

### **Article references**

Articles in Wikipedia must be based upon reliable, third-party published sources with a reputation for fact-checking and accuracy. References are thus an integral part of the discourse built in any article in Wikipedia, legitimizing the content of the article according to Wikipedia's

core policies. Contributors to the Web 2.0 article referenced 319 external sources during the first 5 years of the article's life, but no more than 46 references were used at any one time in the article. References came and went indeed, their life-span depending on how reliable, accurate and reputable they were considered to be by the Web 2.0 Wikipedia community. Some remained for over two years, others no more than a few hours. None spanned the article's first 5 years of life.

We categorized the references into 4 different types: articles (161), examples (88), forums and reference sites (58) and podcast and videos (12). Articles were essentially essays on various aspects of Web 2.0: its definition, criticisms, applications, etc., and originated from various sources, most of them online-based. Indeed, the online world seemed to be the place where contributors not only monitored the discourse about Web 2.0, but found their preferred references. The majority (40%) of articles came from blogs (e.g. Tim O'Reilly's blog O'Reilly Radar, Nicholas Carr's blog Rough Type). Online magazines and newspapers (e.g. ZDnet, Wired, CNet, Business Week, PC Magazine, PC World) were the second biggest sources of articles (33%). Other media such as academic papers (8%), books (4.6%), etc. were also used but to a far less extent. Articles had the longest life span of all references, with a mean duration of 276 days (sd 406). It is interesting to note that, of the 319 referenced articles, 17 were published before the first entry in Wikipedia: 6 academic papers, a book and 7 blog articles. Contributors were relatively quick in referencing the latest thinking in the article. The mean and median time differences between the time an article was published and referred to in the Web 2.0 article were 94 (sd 166) and 24 days respectively.



**Figure 5. Evolution of the types of references used in the Web 2.0 article**

Contributors also used examples to support their writing. These were all instances of websites they believe to be representative of “Web 2.0,” such as [www.del.icio.us](http://www.del.icio.us) (a social

bookmarking site) or [www.flickr.com](http://www.flickr.com) (a photo sharing site). Wikipedia itself was cited, and in one case, [www.24sevenoffice.com](http://www.24sevenoffice.com), a provider of Web based business systems, the reference linked to a Wikipedia page dedicated to the company. Many examples were contentious, some contributors using the article to advertise or reference their own businesses, for instance. These examples were usually rapidly identified as spam and eliminated. Examples had a relatively short life span with a mean of 68 days (sd 138).

Among other reference types, under the denomination “forum” we included online discussion groups and conference sites related to Web 2.0, which were referenced for their utility as sources of information rather than for specific content, as none of their material was referred to explicitly in the Wikipedia article. Another type, reference sites, are online sites that provide general information about Web 2.0, such as providing directories of “Web 2.0” sites, applications and services, or help on how to design a Web 2.0 site, for instance. Forums and references sites together had a mean life span of 48 days (sd 75).

Finally, a few videos and podcasts were referenced, featuring people discussing various aspects of Web 2.0, or animations illustrating the concept. Videos and podcasts also had short lives in the article with a mean duration of 53 days (sd 57).

In Figure 5, we present the evolution of the number of new references used by types every month. Contributors made few references to external sources during the first 6 months of the article’s life. The most intense period of referencing took place during the next 10 months, when contributors frequently cited examples to support their claims, and also began to cite online magazines and newspapers. As time went by, fewer new examples appeared, probably because the major relevant ones were exhausted. New article citations continued and represented the main

referencing activity. More traditional sources of references (books, academic papers) made their first appearances during the 14<sup>th</sup> month; videos and podcasts were first used during the 18<sup>th</sup> month.

### **Talk pages**

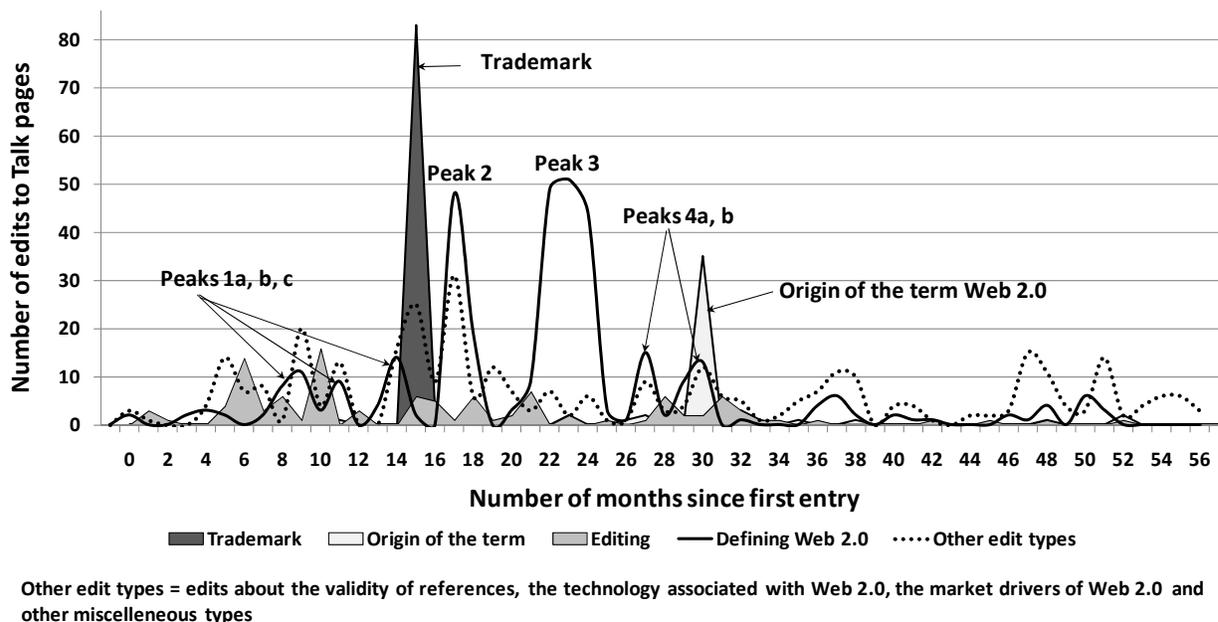
Talk pages provide a place for contributors to discuss ideas, argue about content, settle differences, etc. They are organized by topics of discussions, each under a title usually chosen by the person opening the discussion. To contribute to a particular topic, contributors edit the Talk page, inserting their comments within the text related to that topic. Intensity of the debate about a topic may thus be measured by the number of edits made to the page for that topic.

The Web 2.0 Talk pages were edited 913 times by 251 participants during the first 5 years of the article's life. The majority were registered users (54.6%), followed by anonymous users (38.2%). Administrators (5.2%) were less vocal, while bots (2%) dealt with vandalism (Talk pages are also subject to vandalism) and maintenance tasks. Registered users made 77.5% of all edits, followed by anonymous users (15.6%), administrators (3.6%), and bots (3.3%). Although the participants might seem to have been many, only 14 made 10 or more contributions to the various topics. Not surprisingly, this small group was constituted by the same individuals who edited the Web 2.0 article the most.

Topics of discussions were varied, and we classified them in several categories. The main topic of discussion related to the definition of Web 2.0 (39.5% of all edits). Seventeen percent of all edits concerned the maintenance of the Talk page itself: signing missing comments, archiving the content, vandalism and its restoration, etc. Another topic (11.9% of all edits) was related to the "editing" of the content of the Web 2.0 article: cleaning up article sections, vandalism, grammatical and orthographical issues, etc. Others included discussions about the validity of references (5.9% of all edits), the origin of the term Web 2.0 (5.8 %), the technology associated with it (4.4%), the

market drivers of Web 2.0 (2.2%) and other miscellaneous topics. One unique topic arose in May 2006 following the registration with the United States Patent and Trademark Office for a service mark on the use of the term “Web 2.0” for live events by United Business Media, an English multimedia organization that O’Reilly partnered with to launch the first “Web 2.0” conference in 2004. This event engendered much discussion at the time of its occurrence (9.3% of all edits).

Evolution of the number of edits made by topics of discussions is shown in Figure 6.



**Figure 6. Evolution of topics of discussions in Talk pages**

Contributors engaged in few discussions during the first 6 months of the article’s life. These revolved mainly around the quality of the article, how to improve it, or expressions of misgivings about the value of dedicating a page about Web 2.0 in Wikipedia.

During succeeding months, the debates related to the definition of Web 2.0 intensified, and we identified several peaks (1 to 4) as shown in Figure 6. During months 8-16 of the article’s life, the discussions about the meaning of Web 2.0 saw three small bursts of activity (peaks 1a, 1b and 1c). Contributors during that period had mixed opinions about Web 2.0. While some believed it was important, others thought the term fuzzy and ill-defined, characterizing it in many ways

including “a joke,” “pointless buzzword vaguely defined,” “an investment term - not an internet or technical one,” and “marketing/PR talk.” One, also a main contributor to the article (28 edits), summarized well the tone and substance of the discussions during that time:

“The fact is (and even the most rabid proponents in this discussion are now finding it hard to deny this) that there is no definition of Web 2.0 - indeed there is no such thing as Web 2.0...this whole spin will be over in short while when the world catches up with the game.”  
~Nigelj, January 2006

But, to those who found little substance in the term, the most frequent contributor to the article replied:

“...it's utterly immaterial to Wikipedia: the term exists, no matter how vague or stupid it is, and this page should describe it as it is commonly used.”  
~Artw, 6 June 2006

A second period of intense discussions occurred during months 17-20 of the article’s life (peak 2), and addressed the rewrite of the lead paragraph. Discussants, a handful of main contributors, argued rather circularly about the emphasis that should be given to the “marketing” aspect of the term Web 2.0. For some, the lead paragraph should define Web 2.0 as a marketing phrase, as opposed to an IT term, while others sought to downplay such emphasis. The remainder expressed contentment with the current lead as capturing well and fairly, in their eyes, the various representations of the term Web 2.0 that had emerged.

A third period of intense discussions occurred at months 21-26 (peak 3). Two main topics monopolized the attention of, again, a handful of main contributors. The first topic concerned the classification of the article into the “Neologism” category in Wikipedia. (Articles in Wikipedia can be indeed categorized into various categories to help readers in their search.) At the time of the discussions, the Web 2.0 article had already been put into the “World Wide Web,” “Web Services,” and “Buzzword” categories. Although for some

the categorization was obvious, others challenged the very existence of the article in Wikipedia.

The second topic in the third period concerned a request to vote on the inclusion in the lead paragraph of the dismissive quote by Tim Berners-Lee mentioned at the outset of this paper. Several contributors entered the discussion and argued vehemently. Proponents of inclusion argued that such an authoritative statement was necessary:

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"We need the Tim Berners-Lee (TBL) quote to dispel the impression that this is a well-defined and ratified term. TBL is one of the few technicians that is qualified to make a statement like this, and the lead paragraph is where it belongs..."  
~ Beachy 8 February 2007
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Opponents believed that the quote was too derogatory, difficult to balance in the lead paragraph and should be used, if at all, later in the article:

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"The selective quoting is overly negative. I'd much rather see a fuller expansion on his views later in the article. The lead should be a simple, concise explanation of what the term means, which is expanded on later." ~  
Artw, 7 February 2007
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The last intensive discussions related to the definition of Web 2.0 occurred during months 27-32 months of the article's life (peaks 4a and 4b), when two contributors commented on the editing and requested feedback. One anonymous contributor felt that the article was plagued with jargon, weasel words, etc. and should be cleaned up. To emphasize his point, he tagged the article (that is he placed a text box on top of the content of the article) with: "This article appears to contain a large number of buzzwords. Please help rewrite this article to make it more concrete and meaningful." Many agreed that the article still needed work, but that felt that such tagging would revive edits wars related to issues that had been extensively discussed and resolved in the past.

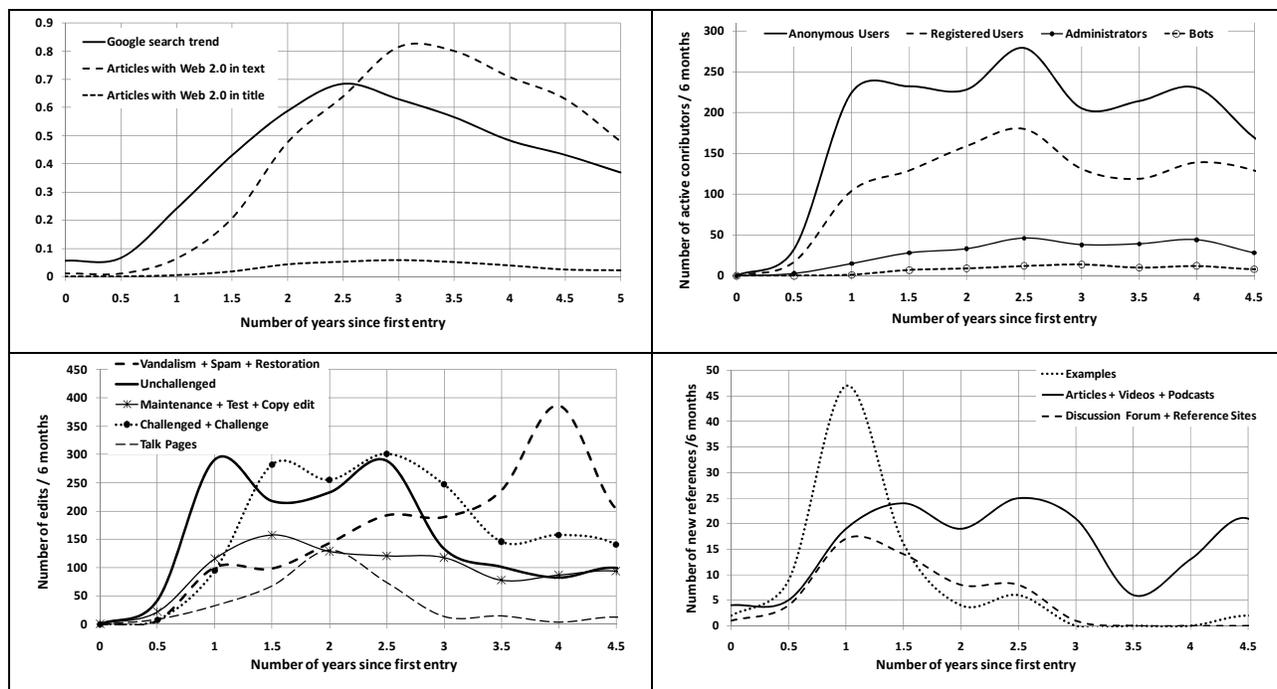
As we see, Talk pages proved to be an important discursive tool, which helped contributors in building the content of the main article.

## **Web 2.0's career in Wikipedia**

Lastly, from the above analyses, we summarize the career of the organizing vision for Web 2.0 as captured by Wikipedia. We saw above that the discourse about Web 2.0 in Wikipedia, as captured by the narrative, the discussions in the Talk pages, and the references used, followed an interesting rising then decreasing pattern after an initial period of low activity. We chose to categorize this pattern into three main periods: Germination, Growth and Maturation. The names were chosen to describe metaphorically how the discourse about Web 2.0 evolved both in size and substance over the years. Adapting from earlier figures, we summarize the evolutionary pattern in Figure 7, where we present average values over half-year periods to smooth out seasonal and event effects. We discuss next the three periods in turn.

### **Germination period (0-6 months)**

The Germination period characterizes the initial, almost invisible, but nonetheless critical period in the development of the discourse about Web 2.0 in Wikipedia. During this period, active contributors were but a few registered and anonymous users, with no activity from bots or administrators. The content of the article grew steadily, edits being few and mostly unchallenged. The article apparently had too little visibility to be subject to vandalism or spam. The discourse was largely unengaged by the larger community, with very little discussion in the Talk pages and no edits of the challenge and challenged types. During this period contributors also made few references to external sources.



**Figure 7. Evolution of the Web 2.0 discourse and community in Wikipedia**

The Germination period lasted around 6 months for Web 2.0, during which the few contributors struggled to define the term. One main contributor summarized well the situation in a posting on the Talk pages:

...I've put my money on the table by thoroughly rewriting almost the entire article in something closer to plain English. One problem is that there isn't a clear-cut agreement on a definition. The other is that it barely rises above listing technologies and hinting at how they work together...  
 ~ Dhartung, 1 July 2005.

The period ended rather abruptly, giving way to the Growth period. What triggered this transition, which coincided with the Second Web 2.0 conference, is a matter of conjecture, one of which would be that the second conference ignited attention to Web 2.0 which was immediately translated into Wikipedia contributions.

### **Growth period (7-34 months)**

The Growth period captures how the Web 2.0 discourse in Wikipedia grew both in volume and substance. During this period, the page attracted many more contributors, both anonymous and

registered, and a handful of administrators also joined the crowd. Editing activities dramatically intensified, and contributors extensively used the discursive tools (narrative, Talk pages, and references) at their disposal. As the page received more attention, it began to be subject to vandalism and spam, all performed by anonymous users and restored by registered users and administrators. Anonymous users were not only vandals, and while their contributions were often challenged by registered users and administrators, they also provided the majority of “unchallenged” edits. Maintenance and copy editing activities also intensified greatly, suggesting that increasing attention was paid to the quality of the article.

Discussions during the Growth period also became more frequent and intense. They reflected, as we have seen, struggles in defining Web 2.0 and giving the term a fair representation in the article. There were also increasing edits of the “challenge” and “challenged” types. The article was growing in size but also in substance as the increasing number of references used suggests. By the end of the Growth period, the article recognized the origin of the Web 2.0 term and its controversial and ill-defined nature among two distinct communities: the marketers and the technologists. Web 2.0 was also clearly acknowledged to be a buzzword (it was categorized in Wikipedia as such formally in December 2006<sup>11</sup>).

The Growth period lasted over a remarkable two years, from the 7<sup>th</sup> to around the 34<sup>th</sup> months after the first entry in Wikipedia. The transition to the next period, the Maturation period, is roughly associated with the start of a decline in public interest in the term, as reflected by the Google search trend.

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<sup>11</sup> As of July 2009, there were only forty pages in Wikipedia that had been categorized as buzzwords.

### **Maturation period (34 months onward)**

The last period in the evolution of the discourse about Web 2.0 in Wikipedia is the Maturation period. As the name suggests, this period is marked by the coming of age of the discourse about Web 2.0, and the article's slowing but still ongoing growth, the number of characters being added and subtracted decreasing rapidly.

During the Maturation period editing activities started to decline. There was also a decrease in contributors' presence. "Unchallenged" edits dropped in number, but continued at a slow pace, keeping the article "alive." "Challenge" and "challenged" edits also decreased sharply, and contributors engaged in few discussions, suggesting that a consensus about Web 2.0 may have been reached, or at least that contention around the term was no longer energized. The article also gained a firmer structure, presenting and contrasting in a more balanced way the different views of Web 2.0: promoters of the term were represented by Tim O'Reilly, detractors by Tim Berners-Lee. As today the article no longer professes to offer its own authoritative Web 2.0 definition.

### **Discussion and Conclusion**

To summarize, in this study, we examined the career of the organizing vision for Web 2.0 as captured by Wikipedia, and found that its treatment within the article fell into three distinct periods (Germination, Growth and Maturation), a pattern consistent with the career arcs of organizing visions more broadly. Our findings reveal how Wikipedia, as a discourse vehicle, treats new IT and its many buzzwords, and more broadly captures the careers of their organizing visions over time. We also further our understanding of Wikipedia as an encyclopedia, providing novel insights into its community of contributors and their editing activities, as well as the dynamics of article construction.

We acknowledge the study's limitations which essentially stem from our examination of the career of a single IT buzzword, Web 2.0, over a specific time period, 2005-2010, as captured by a unique discourse vehicle, Wikipedia. Our attraction to the term Web 2.0 was based on its high level of public visibility and discussion, and its representativeness may be questioned. Some IT innovations and their associated buzzwords may indeed receive different levels of attention from the Wikipedia community. For instance, the first entry for Professional Services Automation (PSA) was made in October 2006, and has since been edited 68 times. Its entry, as of July 2009, consists of three sentences with no references. Too, Web 2.0's career began when Wikipedia had itself just achieved high popularity<sup>12</sup>, and the careers of IT buzzwords that gained prominence earlier may be treated very differently. For instance, the first entries in Wikipedia for ERP (Enterprise Resource Planning) and CRM (Customer Relationship Management) were made in April and November 2001 respectively, less than a year after the creation of Wikipedia. At this time Wikipedia was little known and contributors were few: by the end of 2001 the English edition of Wikipedia had 15,000 articles and 164 active contributors (users who made 5 or more edits in a month), compared to 2.7 million articles and 40,648 active contributors at the end of 2008.<sup>13</sup> Finally, we are reminded that we examined the career of the organizing vision for Web 2.0 as captured by Wikipedia, and had we extended the study to include other vehicles, such as blogs, the career of Web 2.0 may have looked somewhat different.

Notwithstanding these limitations, our study provides insights into how Wikipedia, in particular, captures the careers of organizing visions associated with new IT. Unlike other vehicles, Wikipedia captures a continuously updated record of such careers, not only through the editing histories and related discussions, but also through the narrative which accumulates (or at least

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<sup>12</sup> Alexa ([www.alexa.com](http://www.alexa.com)), the traffic ranking site, ranked Wikipedia 9,653 in October 2002 and 8 in September 2008.

<sup>13</sup> <http://stats.wikimedia.org/EN/>

aspires to) the most relevant and reliable knowledge on the subject. This dynamic feature is distinctive to Wikipedia, although may be shared in part by blogs. Other vehicles such as traditional periodicals or annual conferences capture aspects of the career of an organizing vision, according to their issue and occurrence, but they do not function as a *permanent real-time authority*. Even where career histories are depicted in academic articles such as this one, they are only captured at specific time intervals. In contrast, as long as an IT innovation receives the attention of the Wikipedia community and is judged to be worthy, its organizing vision should be continuously captured and updated.

Still, the first or latest “buzz” about an innovation may not be immediately captured by Wikipedia. First impressions or opinions about an innovation are generally not tolerated in Wikipedia, and these will be probably be first captured by vehicles such as blogs, as we saw in the case of Web 2.0. At any point in time, contributors to an article first have to “digest” the information made available to them before turning it into valuable content for Wikipedia. Each new content, whether text or references, may also be challenged rapidly as we have seen, and will only appear in the article long enough for others to reflect upon it should it gain initial acceptance.

As an encyclopedia, Wikipedia is also distinctive in its striving for fair, reliable and unbiased representation of the topics it treats, while at the same time allowing for open contributions which may naturally attract biased interests. Most discourse vehicles are inevitably imbued with some level of contributor self-interest, although this is often masked, as has been documented in other studies (Wang and Swanson 2007, 2008). The quality standards demanded by Wikipedia take time to achieve, however, as our study of Web 2.0 exemplified. The early career of an organizing vision in Wikipedia (the Germination period as we characterized it), is likely to unfairly represent an innovation, with a bias towards what its initial promoters have chosen it to be.

In our study, for instance, the first attempts to define Web 2.0 heavily relied on O'Reilly's views of the term.

With regard to our three-period model of the capture of Web 2.0's organizing vision within Wikipedia, we note that it also characterizes this particular vision's career more broadly, particularly in terms of its launch and subsequent rise to fame and (for some) fortune, but we caution that this probably reflects in part certain peculiar Web 2.0 characteristics. While with others we take Web 2.0 seriously as reflecting substantial IT innovation, we also suggest that as an encompassing term, it is reflective of a self-liquidating Web rebranding campaign. While it has been successful, it suggests that some Web 3.0 will no doubt follow, but one can be skeptical as to whether another such campaign will garner the same excitement. One way or the other, it may be questioned how long the community's interest in Web 2.0 as such will continue to percolate. And while the current Web 2.0 article in Wikipedia has reached a certain maturity, it remains to be seen what happens to the article over the longer term, when history may well come to be rewritten.

Avenues for future research are many, and we make three suggestions. First, Wikipedia proved to be a very rich and useful research medium for investigating the career dynamics of organizing visions. Future research should take advantage of the many features offered by Wikipedia to investigate, through multiple case studies, the various facets of development of other past, recent and up-coming organizing visions, seeking in the process to automate some of the analyses we performed.

Second, we suggest studying in parallel the careers in Wikipedia of a set of carefully selected IT buzzwords. IT innovations rarely stand alone, and it would be interesting, for instance, to study the careers of a set of interrelated IT innovations in Wikipedia. For instance, in Wikipedia the concept of cloud computing generally incorporate three other concepts: Infrastructure as a

Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS), which have careers of their own in Wikipedia.

Finally, our study showed that blogs were a major source of references for contributors to the Web 2.0 article. People were blogging about Web 2.0 well before the first Web 2.0 entry in Wikipedia and well before the term received much media or general public attention. Blogs are popular discourse vehicles among the IT/IS community, and their study may provide interesting insights into the early careers of past or up-coming organizing visions.

Apart from our findings on the career of Web 2.0 as an organizing vision, our study also contributes to Wikipedia research more broadly. It offers detailed descriptions of the development of a Wikipedia article from its inception, examining together the evolution of its community of contributors, the dynamics of their editing and referencing activities, and their discussions in the Talk pages. Of course, the Web 2.0 article is not representative of all articles in Wikipedia. The recency and popularity of the term, its ill-defined and controversial nature and field of use make it unique. Still, we gain novel insights into various aspects of a Wikipedia community and its editing activities, as well as the dynamics of article building.

Our first contribution lies in revealing how a community of Wikipedia contributors came together to build an article from scratch, showing how registered users, anonymous users, administrators and bots all contributed to the development of the article to different extents and at different times. Among a rather ephemeral community, we saw a small core of active contributors emerging and persisting, watching over the development of the article. Although this group contributed the most edits to the article, it left the article's actual building to others (80% of all the "unchallenged" text added to the article was contributed by those with fewer than 10 edits). This same group also participated in or led most of the topic discussions, reminding newcomers of the

article's history and prior debates. In all, the core group was central to the article's development, supervising and to some extent guiding its course, harnessing the "wisdom of crowds" (Kittur and Kraut 2008; Kittur et al. 2007), and also holding, in a sense, the institutional knowledge that had been gained since the article's inception.

Second, our classification of the various types of edits into unchallenged, challenged, challenge, and test, refines and complements the existing Wikipedia editing terminology. The evolution of the distribution of these edit types should help us understand and characterize better the development of Wikipedia articles. For instance, periods of intense interest and contention may be reflected by an increase in challenge and challenged edits. In turn, a decline in unchallenged edits may reveal a loss of interest in the article or its maturity. On the whole, the extended terminology helps researchers better reflect the editing purposes of Wikipedia, in classifying contributors to according to specific roles (e.g. spammer, vandals, restorers, challengers, substantive contributors, etc.). In the present study, for instance, most of the main contributors played a balanced combination of the "substantive contributor" and "challenger" roles. The main contributor, however, was clearly a "challenger," half of his edits being of the "challenge" type.

Finally, we suggest that the three-phase model we developed to describe the career of Web 2.0 in Wikipedia may also be a useful tool to characterize the evolution of articles in Wikipedia. At the moment, Wikipedia articles are classified in three categories according to their stage of development<sup>14</sup>: uncreated articles (ideas in the mind of contributors), stubs (very short articles, only a few sentences long), developing articles (articles at various stages of development with still some weaknesses) which grow to become good articles (Wikipedia's criteria for good articles include well-written, factually accurate, broad in coverage, neutral, stable, illustrated by some images) to

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<sup>14</sup> [http://en.wikipedia.org/wiki/Guide\\_to\\_improving\\_articles](http://en.wikipedia.org/wiki/Guide_to_improving_articles)

featured articles (the best articles in Wikipedia as determined by Wikipedia's editors who review candidate articles for accuracy, neutrality; completeness, and style). Our model provides an alternative, but complementary new vocabulary to describe the life cycle of articles in Wikipedia. The Germination period captures the fragility of the early beginnings of an article, and its struggle to gain enough attention from the Wikipedia community to survive. Many stubs develop into fuller articles, but those with little substance are rapidly eliminated. The Growth period represents the most active period of development for Wikipedia articles. During that time, articles gain substance and nuances, references are increasingly added to legitimize content, and discussions among contributors intensify. Articles at this stage, however, still require much attention: facts may require checking, content may need cleanup (copyediting, grammar, linking, etc.) or expansion, etc. Most articles in Wikipedia fall into this phase. Finally, articles that have reached the Maturation period should arguably show acceptable levels of quality and stability over time according to Wikipedia standards. Whether they do or not may be systematically studied, as may be routes to becoming featured articles.

Although our study contributes to our understanding of the creative process in Wikipedia, much remains to be done. Much can be learned by comparing how the content of different articles evolves, and by contrasting the characteristics and activities of the communities involved in their building. Considering the article and its community of contributors as unit of analysis, as opposed to the whole of Wikipedia, should further our understanding of how articles are constructed, and should ultimately able us to assess better their quality, credibility and impact. Such an approach suggests looking at Wikipedia not as one community, but as a set of smaller sub-communities getting together for the purpose of building articles.

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### Appendix A. Major events coinciding with an increase in interest in Web 2.0

Months since first entry	Event date	Event
-4	October 5-7, 2004	1 <sup>st</sup> Web 2.0 Conference, San Francisco
8	October 5-7, 2005	2 <sup>nd</sup> Web 2.0 conference, San Francisco
10	12/22/2005	"Bubble 2.0," The Economist
13	March 20-22, 2006	Microsoft MIX06 Conference, Las Vegas
15	05/26/2006	Web 2.0 Service Mark controversy
18	07/28/2006	Tim Berners-Lee dismisses Web 2.0
21	November 7-9, 2006	Web 2.0 Summit, San Francisco
23	12/13/2006	Times Person of the Year: You
26	April 15-18, 2007	Web 2.0 Expo, San Francisco
32	October 17-19, 2007	Web 2.0 Summit, San Francisco
38	April 22-25, 2008	Web 2.0 Expo, San Francisco
45	November 5-7, 2008	Web 2.0 Summit, San Francisco
49	March 31-April 3, 2009	Web 2.0 Expo, San Francisco
52	06/10/2009	Web 2.0 millionth English word?
56	October 20-22, 2009	Web 2.0 Summit, San Francisco
57	November 16-19, 2009	Web 2.0 Expo, New York