# LogiLogi: The Quest for Critical Mass

# Wybo Wiersma

k0931011

`mail@wybowiersma.net`

Supervisor: John Lavagnino

The total length of the dissertation (text and footnotes) is 10,965 words.

Candidate's signature:

September 15, 2010

# Contents

## List of Figures

# List of Tables

# LogiLogi: The Quest for Critical Mass

**Wybo Wiersma**
k0931011
King's College London
`mail@wybowiersma.net`

## Abstract

Social software needs an active user community before it becomes attractive to new visitors. We analyze and describe an attempt at attaining such critical mass for LogiLogi.org. LogiLogi is a philosophical discussion platform that is different from forums and wikis. It provides a form of quick, informal publication, peer-review, and annotation of short philosophical texts. We have examined the limited literature on critical mass, and two usability studies were done. Then LogiLogi was improved in ways that would maximize its chances of attaining critical mass. Some of our conclusions can be useful to other applications as well.

## 1 Introduction

In this paper we will report on an attempt at, and the problems involved in, gaining a critical mass of users for LogiLogi, an interactive hypertext application for the Digital Humanities (DH). The aim of any DH application ultimately is to be used, but for collaborative ones, the contributions and interactions of existing users are what make it worthwhile for new visitors.

Yet gaining critical mass is notoriously hard. Even Google, a billion dollar company native to the web, has failed at it for several of its products. Recently, for example, they discontinued *Google Wave* because of a lack of critical mass.[84,38] So far we have not succeeded in attaining it for LogiLogi either, but we tried hard, and learned a few lessons in the process.

LogiLogi is a Web 2.0 application that tries to find an informal middle-road between good conversations and journal-papers by providing a form of quick, informal publication, peer-review, and annotation of short philosophical texts, without taking the fun out of it by making things too complicated. It is intended for all those ideas that one cannot turn into a full sized journal-paper, but that one deems too interesting to leave to the winds. It does not make use of forum-threads like earlier web-systems, but of tags and links that can also be inserted into documents by others than the author.[53,81,91,89]

We will continue this papers introduction with a short discussion of the limited literature on critical mass, clarifying the problem, and establishing a workable definition. This will be followed by a detailed description of LogiLogi, so we have a good understanding of the platform we are working with. Next, we will report on two usability studies which we have done to inform us of possible usability improvements for LogiLogi.

Then four sections will follow: 'Outreach', on how to define, and reach an audience, 'Atmosphere', examining how to make them want to be there, 'Value', on what they can get out of it, and 'Market', on other projects, and how they can interfere. In each we will discuss three attention points relating to the attainment of critical mass. Along the way we will analyse how we can, and have improved LogiLogi. Finally we will wrap up

with a conclusion in which we shortly discuss the lessons learned.

To set out some limits of this paper, it, first of all, is only is a critique of LogiLogi and the process of attaining critical mass for it, and thus is of a rather narrow scope. Secondly, though it contains a generally useful analysis of the points of attention in relation to critical mass, it does not give a magic recipe for the attainment of it. It rather is a practical investigation into this largely unexplored problem.

Finally, this paper is qualitative in its approach. The number of users required for critical mass is not something which can be precisely predicted for a new platform such as LogiLogi. Critical mass can only be recognized once it's there.[70] In addition, as no critical mass was attained, no analysis of the usage data leading up to it was possible.

## 1.1   Problem

The problem is that of initiating a successful web-community. LogiLogi tries to connect people by gathering them around the texts they produce, review, rate and remark on. If there are no users it is not useful for newly arriving visitors, but unless it is useful, there are going to be no users to make it useful.

The value that connections create if they appear, is a network effect. The simplest example of a system that exhibits network-effects is that of a phone network: If you were the only person in the world having a phone, it would be completely useless to you (except maybe as a status-object). Similarly, *Facebook* probably is valuable to you because your friends are on there.[29]

John Platt described the problem of initiating a network as a type of *social trap*.[64] A social trap is a situation in which behaviour that brings small personal advantages, but greater social or long-term disadvantages, is perpetuated nevertheless. The opposite case, in which personal disadvantages keep people from engaging in behaviour which would have greater collective benefits, is called a *social fence*.[51]

Platt identified three kinds of social traps (and corresponding fences): *individual traps*, where, for the same person, the benefits work in the short term, and the disadvantages in the long term (smoking with risk of cancer is an example); *missing hero traps*, where a collective problem can be alleviated by the (for him disadvantageous) actions of a single individual; and *collective traps*, where the collective disadvantage can only be alleviated if most actors cooperate (a tragedy of the commons such as the overgrazing of a common pasture is an example).

A particularly hard to tackle type of social trap are nested social traps; what Platt calls *social chains*. These are situations in which multiple social traps interlock and reinforce one another. An example of this is gang violence in poor neighbourhoods (poverty induces crime, crime makes police appear dysfunctional, gangs offer some protection, but perpetuate crime and violence and thus poverty).

The existence of social traps indicates that the free market, or even free choice, can sometimes lead to sub-optimal, or even detrimental outcomes.[50] Critical mass problems are among these: they are social fences that can be classified in between the missing hero and collective trap types.

## 1.2   Our conception of critical mass

There is no agreement in the (scattered) literature on a definition of critical mass.[35,57,61,60] The simplest conception is that of a threshold. That is; the minimum number of users required for an application to display network-effects.[25] Here one can see network effects as a positive thing, as something which adds to the value of the application, and can help spur its adoption-rate. Alternatively, with Jacob Goldenberg, one can see it as a constraint.[36] In his model the value of the product is assumed to be fixed, while network effects prevent adoption before a threshold of users is met. However, this latter way of putting

things seems rather artificial, and does not acknowledge the positive, and variable value that can be derived from the network.

Another concept of critical mass is that of a minimum core group of active users needed to sustain the community. This concept adds the possibility of a relapse in activity levels that brings an application under its threshold of active users again. It is analogous to the concept of critical mass in physics: the smallest mass that will sustain a reaction.[27] Sometimes this concept is also pictured as a core of users that are (much) more active than others. But there is little to say for this latter interpretation, as a community could of course also be maintained with a bigger group of people that don't contribute that often. Though, as Jan Marco Leimeister has found, most people seem to prefer smaller (around 150 active members), and relatively intensive web-communities.[49]

We will be working with a combination of these two minimalistic conceptions of critical mass: a threshold for the minimum group of active users required. But for the sake of completeness it has to be mentioned that at least two more exist. The first is a concept of critical mass as a phase of self-sustaining, runaway growth. And the other is a saturation-model of critical mass, where only once enough people have joined an application, the others receive enough invitations to be pulled in as well.[88,75] We decided against using these conceptions as they demand even more of the applications popularity, are more complicated, and also seem to (wrongly) assume that growth is a necessary component of critical mass.

## 2  LogiLogi: What is it?

We will now give a basic description of the LogiLogi platform, so we have a better understanding of it, and its limitations.

### 2.1  Hypertexts: Slim, Smart Hypertexts

Texts are called logis on LogiLogi. This name is derived from the Greek word 'logos', which denotes word, though and thesis, and was also used by Aristotle to denote rational discourse. Texts are kept short on LogiLogi, at maximum around 1,000 words. They are kept so short in order to maximize the advantages of hypertext. A philosophical treatise split up in short logis is more modular, and can be more easily linked to. Especially when the parts are written concisely, and make only one point or express one main idea each. Also, in a practical sense, keeping texts short allows them to be easily displayed and read on-screen.

In addition, texts on LogiLogi don't need to be fully developed or perfect when published. They can be informal drafts at first, which can then be improved upon later, possibly only when they arouse enough interest. This allows one to explore and share many more ideas than would be possible in fully fledged journal articles. While LogiLogi may have some resemblance to a Wiki, it is not, because, among other differences, pages on LogiLogi can only be edited by their authors. This to allow authors to retain intellectual responsibility for their writings, which is necessary for philosophy, and an important value in the academic world.

Nevertheless, texts on LogiLogi are fully interactive hypertexts. That is, while others cannot change the text of a logi, they are able to annotate any text, word or phrase, and to add links to other logis into the text. This is like the adding of a footnote to all copies of an already published article. Also, links don't interfere with normal reading, because annotations and links only show up when a reader hovers his mouse-pointer over them. They appear like little text-balloons which, besides the link, also contain the annotations, and the first few sentences of any logis referred to. An example is shown in figure 1. Additionally, there can be multiple links/annotations/etc. behind the same word or phrase. So there are no problems when users add overlapping links.

In addition to inserting links or annotations

# Welcome to LogiLogi

**Logi links**

1. Bazaar / Logi Logi
   Wybo Wiersma - A Global Collaborative Sphere: Worldv...
   Some would say that we have seen new media before, such as radio for example. But previous new media, among which especially radio and TV, were mass- ...read on

**Annotations**

1. How short? Just a few pages or a specific number of words?
2. Why have they been called logis?

LogiLogi = short hypertexts, easy linking and meritocratic rating. Logis are short documents that you can write and share quickly. They can only be edited by their author,

Figure 1: *A text-balloon showing a link and two annotations attached to the same phrase.*

into logis, people can also reply to logis. Here we differentiate between replying logis and remarks. Remarks are meant for short spontaneous notices or questions, and thus cannot be replied to in a threaded way, nor can they be annotated themselves. They are shown at the side of the logi, and they expire over time (see figure 2). Commenting logis, on the other hand, are like any other normal logi, and thus can be annotated, and receive replies themselves. For all replying logis, the first few lines are shown below the logi they are commenting on.

Differentiating between remarks and logis is done in order to make replying logis more like journal articles, than like forum replies: they can be referenced on their own, and also be brought into other discussions later on. To make this even easier, every logi has a permanent link (so called permalink), which is a stable reference that will always refer to the same logi. Thus, when citing a logi in a paper, this is also best done via its permalink. In addition it is also possible to refer to any specific version of a logi, because the history of all previous versions of logis is kept, and there are special permalinks to versions too.

## 2.2 Links: A Diversity of dynamic Links

Links are not just for references, but they are used inside LogiLogi too. As noted, they can refer to logis and to versions of logis, but by default they refer to tags. Where tags are like index-words, given to a logi by its author. Logis can be tagged with one or more tags. And multiple logis can have the same tags. The following is an example of a tag-link (the url of the LogiLogi server, such as http://en.logilogi.org should normally be prepended):

/Aristotle/History

This link refers to two different tags, namely 'Aristotle' and 'History'. All logis tagged with both of these tags will be in the set referred to. If there are multiple logis in the set, they will all be shown in the pop-over balloon on mouse-over. If the link is clicked directly, instead of hovered over, then the user will immediately be led to the logi with the

g-sets that function like categories.
is through one or more of these tags
stacked together as:
ltiple logis can be tagged with the
e than one logi is contending for a
gs decide which one is shown.

have is determined by the ratings
received from readers and other

ntroduction to LogiLogi and it's
phical tradition, browse the logi's on
rt (1,500-words) paper: English,
ull version (14,000-words, English).
Source Software.

**Remarks**

Short remark to author?

➕ add remark

by: **Anonymous ...**

Hola, estoy probando logis a ver si finciona en español....

💬 Attach as annotation

by: **Anonymous ...**

test de remarque

💬 Attach as annotation

by: **Catherine ...**

this is nice

by: **Catherine ...**

💬 Attach something to a phrase

★★★★★  Rating weight: 0.0

★★★★★  Your power: 0.1

Want to give a more in-depth response?

Figure 2: *Remarks are shown at the side of logis.*

highest rating. If there are no logis tagged with both tags, then the link will refer to all logis having at least the tag 'Aristotle'. More generally speaking, when there is a row of N tags for which no logis are found, the last is removed, so there are N - 1 tags, and finding a matching logi is retried, until either a logi is found, or only the tag at the front remains. In the latter case the link is considered unresolvable, and shown in dark red. It is then resolved as soon as a logi with the given tag becomes available.

Linking to tag-sets allows one to easily refer to concepts within a certain context, and even incrementally so. In our simple example the historical meaning of Aristotle will be different from his meaning for philosophy. So 'Aristotle/History' should refer to a different description than 'Aristotle/Philosophy', but when an 'Aristotle/History' page has not yet been created, one would be content with the 'Aristotle'- or 'Aristotle/Philosophy'- page. By referring to a page in context, authors can already point out in which direction they are thinking, even before having to create the pages referred to. And of course when a page with a contextualized tag-set is created, such as 'Aristotle/History', there will be no name-clash (with the other 'Aristotle' pages).

Now for the other link-types; Here is an example of a permalink to a specific logi.

/Aristotle/History=Ed_Lee_32

The last part of the link is the name of the author ('Ed Lee' in this example), followed by a number. This number is the 'opus' number of the logi; that is the $N$th logi written by its author. Together they form an unique identifier. A version-link is similar in shape. It only adds a version-number at the end, as can be seen below.

/Aristotle/History=Ed_Lee_32=v2

When links are added to a logi, they are kept track of separately from the text. Thus,

while editing a logi, the links are not present in the text, or in its underlying representation. This allows one to focus on the text, and freely restructure it, without the risk of strange things happening to links or annotations. LogiLogi stores links separately from the text, just like Ted Nelsons *Xanadu* project did.[58,68] It works as follows: the *string* of characters that a text is, is first of all stored separately from the *view* on this *string* that the current version provides. The *view* initially consists of a set of pointers to the begin- and end-points of the *string*. Then, when for example, a paragraph is added to the middle of the text, its characters are appended to the end of the *string*. While a set of pointers to the new characters is inserted in the middle of the *view*. This new *view* is then stored as the second version. Now, when links are attached, they are anchored to the *string* of characters, and not to the *view*, so their references remain stable, no matter what happens to the surface text (the *view*). It is illustrated in figure 3. To keep track of text that is moved around, we developed a longest-common-substring diff algoritm.[22]

### 2.3 Meritocracy: A Fierce and Fair Meritocracy

LogiLogi combines openness with quality control. It does this by allowing logis to be rated, and then showing the best rated logis first. In addition, voting-power varies between authors depending on how well their own writings were rated previously. Authors can thus gain 'standing' and 'influence' through their work.[90] This makes LogiLogi not just a democracy, but a peer-reviewed meritocracy, quite comparable to what we, according to Bruno Latours philosophy of science, encounter in the various structures surrounding journals.[47]

The ratings in LogiLogi are essentially grades, given by visitors and other authors. With each vote a score can be given on a scale of -2 to 5. The average of these scores
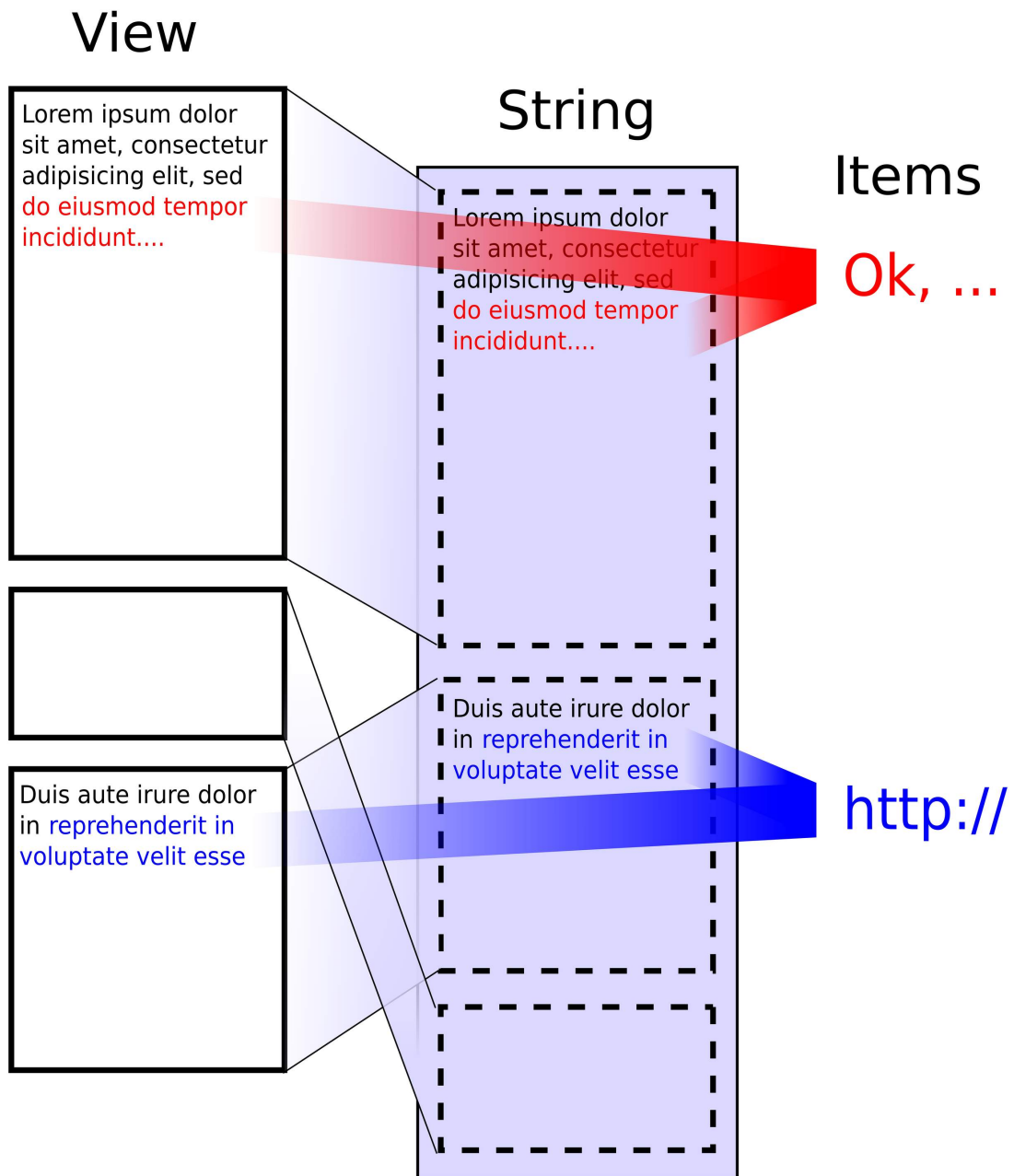
# View

# String

# Items



Figure 3: *A version view, a logi string, and two attached items: a remark and a link. The attached items are stored separately from the text, but they have stable begin- and end-pointers into the string.*

Figure 4: *The rating-bar for a logi when logged in as an user who has voting-powers larger than 1.0.*

forms the rating of the logi. These averages are weighted averages, because voting-powers can vary. Anonymous users and people with accounts begin with 0.1 respectively 1.0 voting power. This is their *base power*. In addition, people with an account can receive extra voting powers (so called *honours powers*) for each of their logis which are positively rated.

The formula for awarding the extra voting-powers based on the rating, is calculated as follows:

$$rating^2 * 0.05$$

So it is 5 percent of the square of the rating (0.05, 0.2, 0.45, 0.8, 1.25 for scores 1 to 5). The rating is — as noted — the weighted average of all votes given to the logi. So *honours powers* are not given for every vote, only for their standing weighted average. And they are given in realtime, so when the scores given in new votes are lower than this average, the extra voting-power received from the rating will be reduced again. The distinction between beginning authors and distinguished reviewers is thus a gradual one. This allows for a natural representation of the differences in experience and knowledge between people.

Now for the calculation of ratings: the rating of a logi is the weighted average of all the scores it received through votes. It, besides having a score between -2 and 5 (let's call it its *height*), also has a *weight*. The *weight* is equal to the powers of all votes it received. Thus for example a new vote of 5, with power

1 added to a current rating of 1 with *weight* 3, results in a new rating of 2, with *weight* 4. Simply adding up weights, however, leads to the entrenchment of ratings over time: it would make ratings ever harder to change by subsequent votes.

To fix this problem — and to give new votes a chance — the *weight* of the rating is decreased each night with a fraction in such a way as to result in a half-life of four weeks. So at the end of the month the *weight* of the rating is half as big as it was at the beginning of the month. If no new votes come in, the *height* of the rating remains as it is (its *weight* just drops), but if they do come in, they can influence the rating more easily because of its lesser *weight*. It should be noted that no half-life applies to the voting-power of authors because *honours powers* are based on the *height* of ratings, not their *weight*.

### 2.4 Software: Previous improvements

Work on the first version of LogiLogi (LogiLogi Plankton) began in the first quarter of 2003. It was not much more than a modified version of an Open Source Wiki (Wiki Tikki Tavi). The foremost features added were nested sections (primitive version of LogiLogis tag-links, see section 2.2), and dynamic multi-language support (if a page did not exist in the users preferred language, it was shown in another language, in order of preference).

In 2005 an attempt at a C++ implementation of LogiLogi was made (LogiLogi Algae), for which even a make (build-tool) replace-

*by:* **Justin William Zij**

Interests: Comparative philos
Analytic), Oriental (Confucia
doing philosophy, introspectic
foundations of numbers  (time
(noneuclidean ...read on

*tags:* Justin William Zijlstra / User

*Has 0 replies.*

**Hypertexts:**

*by:* **Wybo Wiersma**

Texts are kept short within Lc
They are kept so short in orde
hypertext. A philosophical tre
modular, and can be more ea
when the parts are written ...r

*tags:* Logi Logi / Hypertexts

*Has 1 reply.*

**The Object**

*by:* **Kalle Van Der Wa**

The question I want to raise h
phenomena be functional? In
relatively clear. Traits can be
are huge debates in biology d
criteri...read on

*tags:* Functionalism

*Has 0 replies.*

**Some quotes**

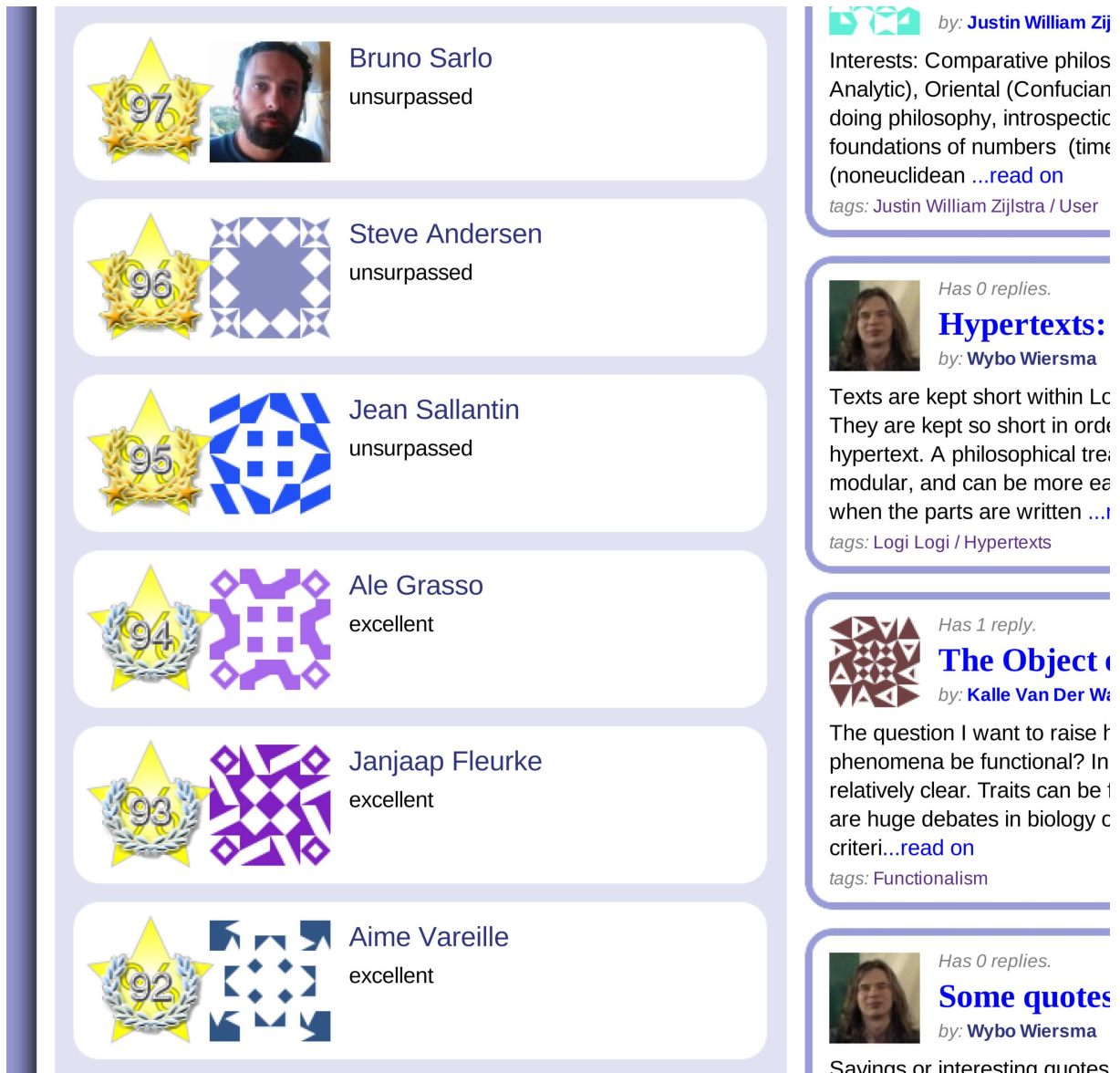*by:* **Wybo Wiersma**

Savings or interesting quotes

Figure 5: *Ranked authors on LogiLogi.*

9

ment (lake, for LogiLogi.org Make) was developed. When we switched to Ruby and the *Ruby on Rails* web framework, the Algae version was abandoned. Webframeworks such as *Ruby on Rails* take away many choices and provide a straightjacket of good practice.[72] Between February 2006 and September 2009, 7 man-years of work went into this new version (LogiLogi Manta). Apart from *Ruby on Rails*, and existing libraries, 88% of the code was written by me, and the remaining 12% was contributed.

Table 1: *Committed lines per author (upto August 2010).*

| Author | Line count | Percentage |
| --- | --- | --- |
| Wybo Wiersma | 148,300 | 88.0% |
| Bruno Sarlo | 12,000 | 7.1% |
| Miguel Lezama | 3,400 | 2.0% |
| Steffen Michels | 2,300 | 1.4% |
| Bart Leusink | 1,500 | 0.9% |
| 6 others | 1,000 | 0.6% |
| Total | 168,500 | |

Table 2: *Current lines per part of the application (August 2010, not including external code).*

| Part | Line count |
| --- | --- |
| Models | 5,300 |
| Controllers | 3,300 |
| Views | 13,200 |
| Tests | 5,700 |
| Misc (Libs, Db) | 8,600 |
| Total | 36,100 |

Work on the Algae and Manta versions had started from ideas about data-structures, and back-end logic, which was the wrong way around, I would say now. Much of the 7 man-years has been spent on features that were later removed again, such as an even more complicated link-system which was based on set theory (sets and sub-sets), and provided different senses for tag words, and the multi-language-fall-back that had been there in the Plankton version.

Bending the back-end towards the user interface, and making things ever simpler, has been the trend in LogiLogi's development over the past few years. During this period Manta also went through three complete UI-revisions, starting out with an UI for which detailed knowledge of the back-end was required, then one devised by a team of students of the *Radboud Universiteit Nijmegen* (Netherlands), and finally the current UI, developed through about a dozen SVG (Scalable Vector Graphics) sketches, with the help of two volunteers (Bruno and Miguel). Finally, LogiLogi has been extensively tested and improved at the *LIRMM lab* of the *University of Montpellier*, last September.

With all this done, LogiLogi was ready for wider use. But given that LogiLogi is a tool for collaboration and mutual critique, having a critical mass of other users present is crucial for this to happen. We will now see how LogiLogi could be improved to increase it's chances of attaining critical mass, starting with the usability studies.

## 3 Usability studies: Are there opportunities for improving its usability?

In order to evaluate the usability of LogiLogi, two usability studies have been done.[71,46] The first in the Netherlands on the 13th of March, and the second in Oxford on the 11th of April. We will present the questions that were asked in both studies first, and then discuss each of the studies findings.

### 3.1 Questions and tasks

Participants were presented with questions and tasks. They used a laptop computer (with a 17 inch screen) and a mouse. LogiLogi was installed locally on the machine. Some of the tasks were not presented to all participants, particularly when participants showed difficulty using the website on the simple tasks. The study consisted of ten items: five questions, four tasks (with 'Task:') and a free

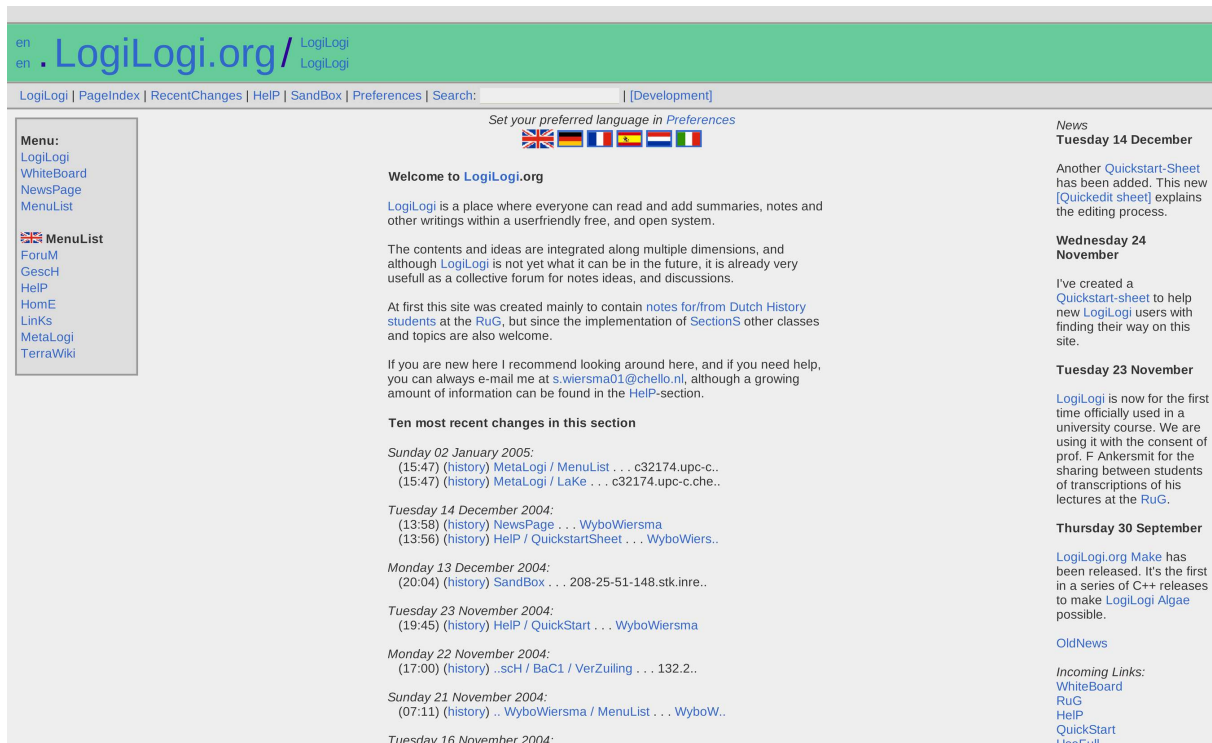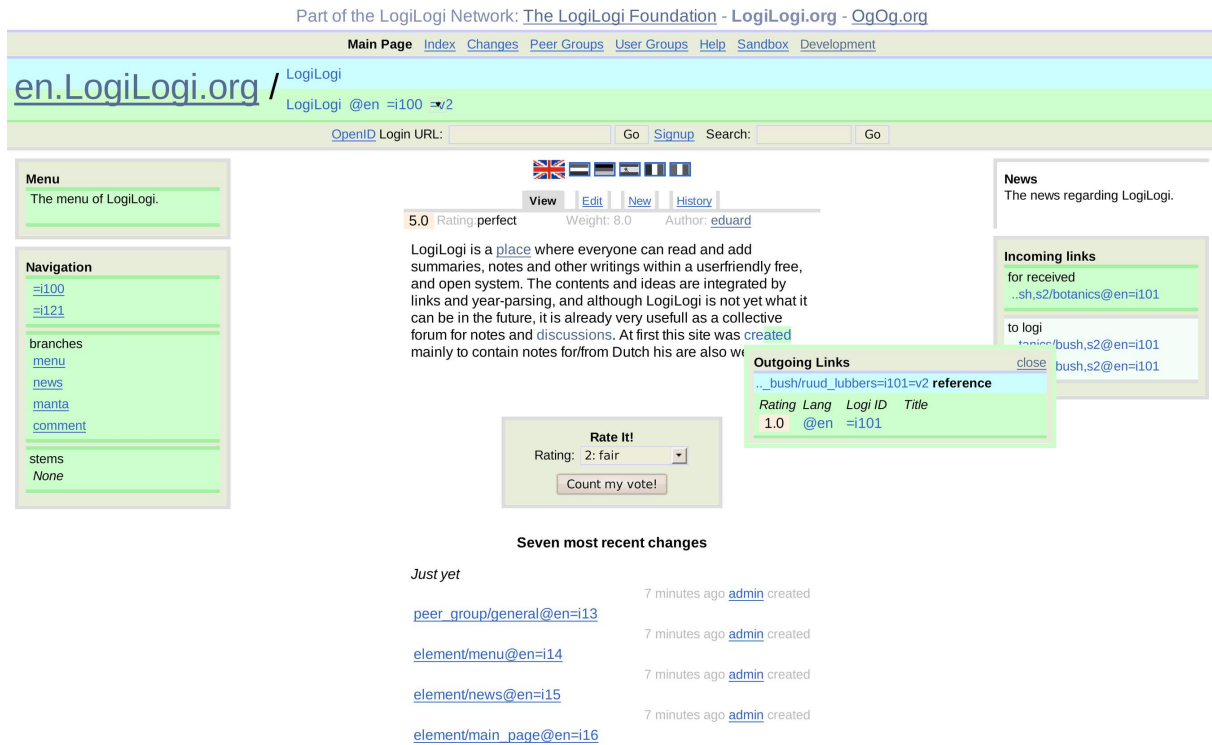Figure 6: *LogiLogi Plankton: a modified wiki, written in PHP.*



Figure 7: *The first user interface of LogiLogi Manta: written from scratch in Ruby.*

Figure 8: *The user interface of Manta around the time of the first public release: based on a design by students of the University of Nijmegen.*



Figure 9: *In the summer of 2008 this main-page was added. It gave an overview of the activity on the site.*

browsing session. They were, in order:

1. *'What is your first impression of the web-site?'*

2. *'What does LogiLogi do? What is the website meant for?'* (participants already knew it was philosophy-related)

3. Task: *'Read the logi about LogiLogi'* (logi was opened for the participants)

4. *'How was the reading-experience?'*

5. Task: *'Create an account please'*

6. Task: *'Now create a new logi'*

7. Task: *'Browse to a logi about Intellectual Property'* (started from the main page)

8. (Free browsing session)

9. *'How do you think the site could be improved?'*

10. *'What would you think about having propositions in LogiLogi, with pro- and counter-points'* (showing 2 mockups)

The first two questions were meant to find out if peoples first impressions are good, and if the message of what LogiLogi is for, comes across in the first minute (many sites fail at this). The third and fourth items were meant to test the readability in a way that would not invite users to lie in order to be done with the question. I kept an eye on facial expressions during the reading, and only after it was completed, I asked if it was a pleasant experience.

Then, the tag browsing (7), account (5) and logi creation (6) were tested. With these tasks the functionality most likely used by new users, was covered. For some participants a free browsing-session was allowed after this. Then the study was wrapped up with two final questions (9 and 10), the first of which was meant to get the user to freely brainstorm

about possible improvements, and the second to present ideas for making LogiLogi more polarized for feedback (having pro-logis on the left, and con-logis on the right, figures 10 and 11).

### 3.2 First study: VFP at the ISVW, 13 March

The first study had three participants. This is the exact number suggested by Steve Krug.[45] The average age of the participants was about fourty, and one of them was not very proficient with computers. The study was conducted during the lunch-break at a meeting of the Dutch VFB (Society for Philosophical Practitioners) to which I was invited to give a presentation on LogiLogi later that day. The VFB is a society for people offering philosophical coaching and consultancy services.

Thanks to the tag-line (and the background-information that participants had), the aim of the website was clear. All of them liked the blue colour-scheme. The readability of logis was seen as good by all participants. This was expected as the sans serif font LogiLogi uses, and the narrowness of the text column, are known to be good for readability. Two participants had problems with the light red background colour of phrases that had been annotated.

When creating an account, one participant tried to use the tab-button to skip from field to field in the form. This did not work at that time. Creating a new logi was also not possible due to an error triggered by there being no internet-connection. Both these problems were resolved before the second usability study. The tags in the tag-cloud were considered hard to read due to their colour and the small font in some of the tags. The fact that bigger tags signalled tags for which more logis were created, was clear to two out of the three participants.

Feedback on the ideas and mockups for having propositions with pro- and counter- arguments was not positive. They were considered too controlling, and not nuanced enough

Figure 10: *Mockup of claims for and against on idealism.*



Figure 11: *Mockup of claims browsing.*

for philosophical writing. Having a topic-list instead was considered a good idea by one participant (the tag cloud, however, fulfils this purpose).

### 3.3 Second study: Mensa Think! at Oxford, 10 April

The second usability study had six participants. The average age was about the same as for the first. Two participants were not proficient with computers. The study was conducted on the first day of the *'Think! at Oxford'* weekend of the *Mensa High IQ Society*. This is an event for members of *Mensa* interested in philosophy, featuring lectures by members, and one invited Oxbridge professor on specific periods from the history of philosophy. The audience was a good match for LogiLogi, as most of the participants were non-academic philosophers.

That month a short paper on LogiLogi was published in the magazine of the *Mensa Philosophy SIG* (Special Interest Group), and one of the participants confirmed having seen the website beforehand. So some participants had prior knowledge. Their first impressions were again positive, though one remarked that the page looked busy, and another that he was drawn to both sides of the page, without an obvious starting-point. Also what a logi was (a document on LogiLogi) was not clear to one of the participants.

The reading-experience was good again, though the background-colour used to mark out annotations was still seen as a distraction. Several participants had problems finding the signup link and the new logi tab, though they were able to find them after some scrolling. Creating accounts and new logis went without problem now. When browsing (item 7), two participants remarked that the tags in the tag-cloud were hard to read, with a white font on a light green background.

During the free browsing stage one user clicked on the OpenID (an universal login system) login tab, and discovered a bug, an-

other wandered to the search-page and found it unclear, and a third noted that the site was quite slow (even on a local installation). He suggested at least showing a small loading-animation, when the user had to wait for an AJAX-response.

When asked the open question, most participants did not come up with suggestions for improving the site. Although one user remarked that the description on the 'add annotation page' could be improved (changed from *'select range to annotate'*, to *'highlight area...'*). Finally adding duality through propositions was again not seen as an improvement, while a new proposal that was added (having blog-like pages for each user, listing their recently written logis) was received positively.

Both studies thus suggested many improvements. We could not implement them all, and therefore we priorized them based on their expected impact on the attainment of critical mass. They are presented and discussed in the following sections.

## 4 Outreach: For whom is the application intended, and how to reach them?

In the final four sections of this paper we will systematically analyse a total of twelve factors (in sets of three) that play a role in the attainment of critical mass. Improvements we have implemented, and further opportunities for improving LogiLogi will be discussed along the way. The first three are: audience, integration and marketing.

### 4.1 Audience

The first factor that determines whether an application can attain critical mass is the audience it targets. A web-savvy audience is more likely to adopt a web application than an audience of people that distrust the web in general. Dorine Andrews, for example, found that middle-aged career-switchers don't trust forums, unless they are visibly moderated and backed by a trusted party.[4] Differences in peo-

ples predispositions towards new technology can also lead to variations in their critical mass thresholds. Peter Swann noted that it is likely that there are local network effects with regard to pioneering: pioneers are most likely to want to call other pioneers, and thus for pioneers, a small network of early adopters will already have critical mass.[78] In figure 12 you can see the different utility functions as set out by Swann.

In addition, Christian Wagner found that people have widely diverging motives to contribute to web-communities such as *Wikipedia*: some work on *Wikipedia* because it is fun, others because they learn from it, some do it for purely altruistic reasons, and yet others to give something back to the community. And means, time available, and skills can also vary between visitors.[95,86,65,42] Also, people that have fewer other outlets for their writings might be more interested in contributing them to a hypertext-community. To speak with Maslow and his pyramid of human needs: if peoples higher needs are met elsewhere, or if their lower needs are not met, they are unlikely contributors.[42]

A strategy that flows from these things is targeting the most willing contributors first, and then grow as the application gradually meets the expectation-thresholds of others. While LogiLogi aims for a wide audience of scholars, students, and people interested in philosophy, most success should thus be expected with students and other youngsters at the fringes of the academy, both because of their limited access to other publishing channels, and their greater average computer-literacy.

In August 2009 we have been asked by Der Blaue Reiter if we could provide LogiLogi as a platform for their readership. This hooks into another, maybe obvious, but important thing: that there must be a desire to use the application among the intended audience.[11] And given that the Der Blaue Reiter readership already forms a community in the off-line world, it will likely continue to be interested in communicating after moving their communications onto LogiLogi. Initially the plan was to launch with them in December 2010, but there have been some delays and extra requests.

The most laborous of these requests was the integration of the browsing-, the main- and the search-pages. It was a good idea to integrate these pages because their functions are very similar (finding out where to go on the site), and separating them only would confuse users. They were separate initially, because in *Ruby on Rails* functionality like this is normally put in separate controllers, with separate views (html pages) flowing from that. Making this change (as well as many of the others), required a lot of changes in the back-end.

In figures 13, 14 and 19 (section 5.1) the initial separate pages can be seen. While figures 15 and 20 show the new integrated page. As an additional benefit of integration (and of some other changes referred to later) the double row of tabs in the initial pages could be reduced to a single row at the top, further simplifying things.

### 4.2 Integration

Another important factor is how well the application integrates with peoples existing practices. Potential users may be tech-savvy pioneers, and thus willing to use your application, but if it does not fit into their workflow, is not interoperable with the software they normally use, or does not work in their preferred browser, then adoption will be unlikely. Taking all obstacles into account, the user must still be able to, and be willing, to use the application.[85]

Integration is greatly helped if users are notified of updates through e-mail or other web-media they are already familiar with. *Google Buzz* (a crossover between a micro-blog-post and a forum) is well-integrated, as it seamlessly hooks into the users Google mail
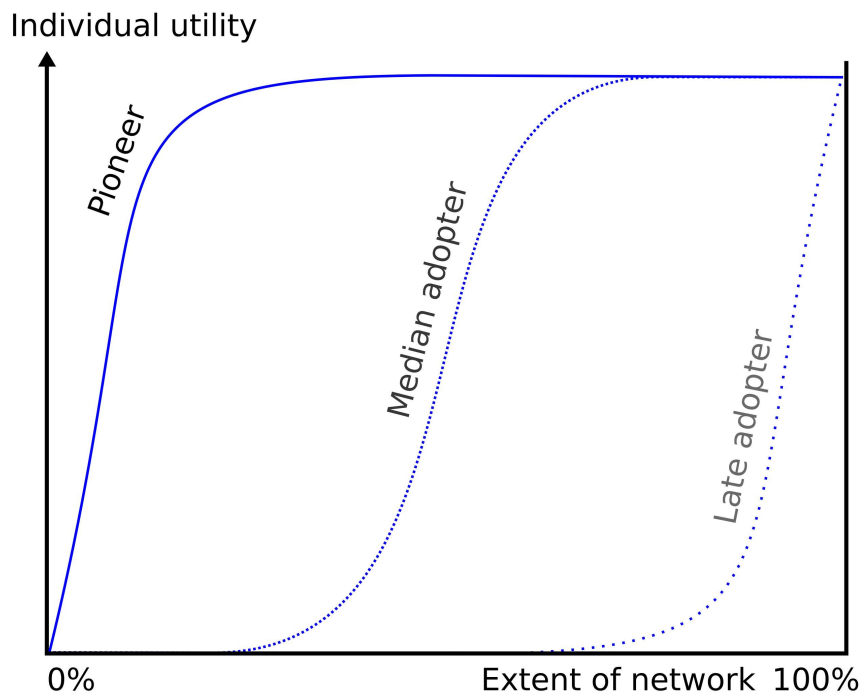
Figure 12: *Shape of the perceived utility of a network.*
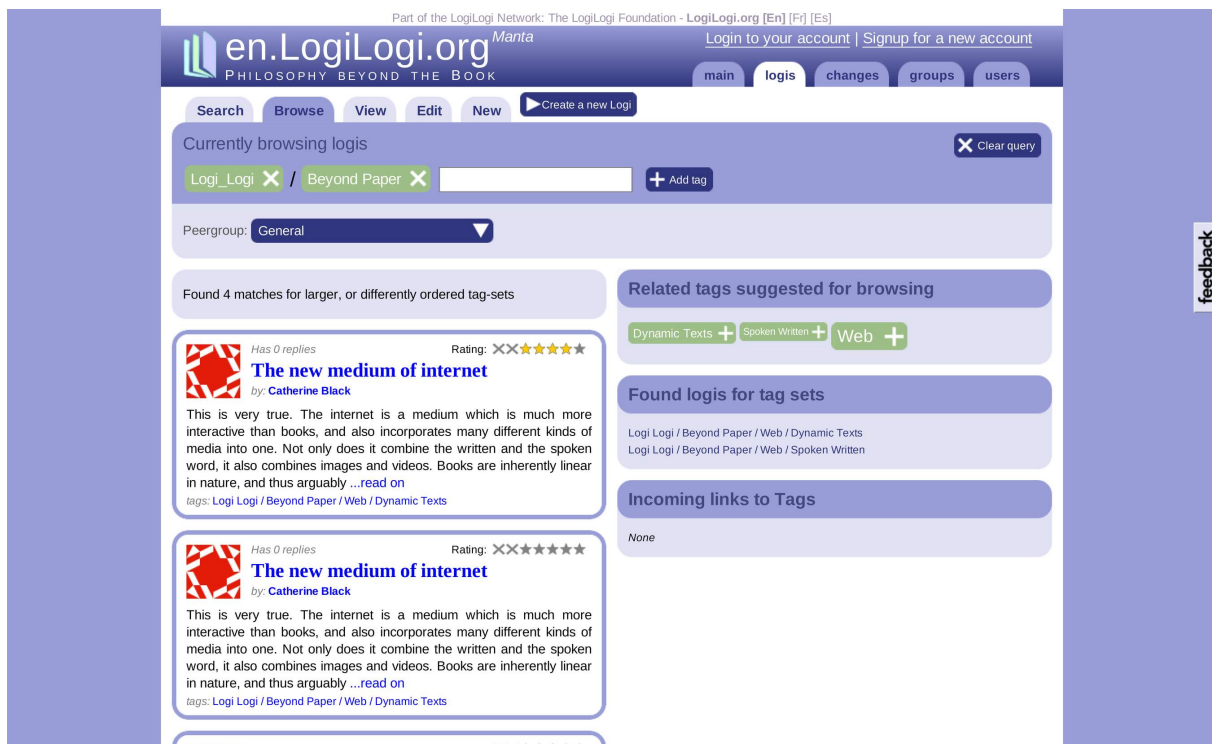


Figure 13: *Before: Browsing as it was in September 2009.*

Figure 14: *Before: The separate search-page.*



Figure 15: *After: Browsing, search, and the main-page integrated in one (both tags and search-terms can be entered).*

box.[37] The constant notifications that *Facebook* sends out are another good example. To hook LogiLogi into users mailboxes, a first, primitive, mail-alerts system was created in September 2009.

It was implemented neatly from the start: Notices of events, such as newly created annotations, were saved to a different web-application (called *LogLog*).[54] Next, aggregates were automatically downloaded by LogiLogi, and then mailed to the user every night. This offered users a way to keep track of things on LogiLogi for the first time. It nevertheless was still very simple, and only sent alerts when ones own logis had received annotations, remarks, ratings, or replies (not replies to ones remarks for example).

Then, during the thesis presentation, Simon Mahony suggested adding weekly mailings of new logis. This required some changes, as it would be against internet etiquette to mail a list of new logis every week, without allowing users to unsubscribe.[19] Subscriptions were thus added (to the database, back-end, and the UI), and an unsubscribe-link is now included in every e-mail, so users can unsubscribe from the new weekly mailings as well.

Besides mailings, *LogLog* is also providing RSS feeds for LogiLogi. There are feeds of new logis, recent changes, and personal updates (relating to ones logis). In addition, to focus attention to updated content, recent changes can also be viewed on the website, and those pages were also slightly improved.[20] The screenshots in figures 16 and 17 show the before and after situations. Finally, LogiLogi also features an APIs for integrating it with existing websites.

Another way in which the interoperability of LogiLogi has been improved, is that support for Google Chrome (8% market share) has been added. Previously it only supported Firefox and Internet Explorer 7+ (together 65% market-share). Adding support for the Safari and Opera browsers (5%, respectively 2% market-share) would be a good idea for the future, as they, just like Chrome, are popular among pioneers.

## 4.3  Marketing

Once an audience has been targeted, and found willing. The last step is letting them know about the application. One way in which this can happen is word of mouth, or the on-line equivalent of this, namely e-mail or messenger recommendations by friends. Locking down an application, and then issuing a limited number of invites per user might increase the number of recommendations sent out, and thereby — counterintuitively — increase signups. Google has used this technique successfully for Gmail. This strategy has the additional benefit of letting people in that are friends already (tapping into local network effects). But it requires being well-known in the first place, and thus is unsuitable for LogiLogi.

In general, user-to-user advertising is the cheapest and most effective option. It often leads to exponential growth (ever faster as one gets more users).[10] An effective way of user-to-user advertising is providing a customized badge that users can put on their blog or website. We have added such badges to LogiLogi. In figure 18 you can see one that has been embedded in a blog.

Another powerful way to spread the word about a new application is by having it featured in interviews, or reviews on blogs.[40] Several key-blogs, such as *Hacker News*, *Slashdot* and *TechCrunch*, are widely read among pioneers, but hard to get into.[41,74,79] We did get LogiLogi featured on a small Dutch philosophy blog.[26] Finally a short Google Adwords campaign was tried in June (limited to the areas of Oxfordshire and Cambridgeshire, to set the right tone). But this did not bring in any new users.

Apart from the already mentioned presentation of LogiLogi at the VFP (section 3.2), and the publication in the *Mensa SIG*'s magazine, LogiLogi was also presented at the *Second*

Figure 16: *Before: The old changes page, with a tab for viewing new logis.*



Figure 17: *After: Changes and new logis side by side on the new changes page.*

social improvement. Given the universal
faces today, I hope my research will be a

RailsPlugin
Release
TextWeaver
ThornyForm
Web2.0

Syndicate

News feed

Wybo Wiersma
99 unsurpassed at LogiLogi.org

Figure 18: *After: A badge embedded in a blog.*

*Workshop on Scientific Knowledge Creation, Dissemination, and Evaluation* in Ovronnaz, Switzerland (February 2010), and at the *DH2010* conference in London (a poster, July 2010). But as with the nine other presentations (including three philosophy conferences) given about LogiLogi in the past four years, these were not very effective at attracting users.

Finally, users are acquired only if new users are arriving faster than old ones are leaving, or becoming inactive. Therefore, users can be gained in two ways: by bringing them in faster, but also by increasing retention.[34] More about that now.

## 5   Atmosphere: Do they want to be there?

We now will look at how LogiLogi could be made more pleasant, so users want to stay. Factors are: usability, interactivity and sociability.

### 5.1   Usability

An applications ability to attain critical mass is closely related to its usability. First of all, because bad usability brings a learning-curve that can incur extra cognitive cost, but more so because it can cause frustration. A lot of research has been done into usability, and besides the users error rate, impediments to access such as logins, and an application being self-explanatory and consistent, were found to be important.[48]

The foremost weak spot of LogiLogi was its usability, especially given it being within our control. Therefore we have done the usability studies (section 3). One of the best ways to reduce the learning-curve that was suggested by people in the usability studies, was creating a screencast that quickly explains the basics of LogiLogi.

The first screenshot (figure 19) shows the main page as it was, while in the next you can see the embedded screencast. The screencast explains logis, annotations, replies, tags, rat-

ings and rankings. It is about two and a halve minutes long, it is hosted on *Youtube*, and it stars Catherine Black, my girlfriend.[87] Other differences that can be observed between the old and the new main page are the colour of tags, which has been changed from green to dark purple in order to make them more readable. In addition, the main page has been simplified a bit by removing the tabs from the three boxes (the cloud, new logis and new users).

Other changes prompted by the usability tests, were: The background-colour of annotated phrases was removed (annotated text is dark green now, see figure 21). Another, already briefly mentioned improvement, was the tab-key order; allowing users to jump from field to field in forms. Other things, such as simply not showing tags, instead of a line with *'tags: untagged'*, for untagged logis, also improved the site a bit (see the replying logi in figures 27 and 28, section 5.2).

Another improvement was creating the illusion of in-place edit, and logi creation. Figure 22 shows the old 'new logi' page, and figures 23 and 24 show the new 'new page'. Which, by showing the contending logis at the side, just like on the view page, give the illusion of in-place edit. Also, the need to supply a tag for logis is made much clearer in the second of these figures, than in figure 22.

Besides all this, most of the descriptions and texts on buttons were made consistent, and have been simplified where possible. For example a technical phrase such as *'select a range of text'* was replaced by *'highlight the phrase'* (figure 26).

An additional aspect of usability found to be important is (speed) performance. This will be a problem for LogiLogi when the load on the server increases. But apart from making a quick improvement to the database (adding indices), we do not consider it a priority until after a small critical mass has been attained.

## 5.2   Interactivity

Related to an applications speed, but different from it, is its interactivity. E.g. how much feedback do users get and how much do they feel in control? *Wikipedias* instant publication is a positive point in this respect.[86] But the now discontinued *Google Wave* took interactivity to a whole new level by making the editing-process itself completely real-time using AJAX (Asynchronous JavaScript and XML). That is, as people collaborated on a document you saw their cursors move through the text, and characters appear as they were typed on everybody's screen.

LogiLogi uses some AJAX as well (for tag-browsing among other things), and has a somewhat interactive interface. But it could be much improved, especially for inserting links. As you might have noticed, on the right side of most screenshots a vertical *'Feedback'* button is visible. It is provided by *UserVoice*. *UserVoice* allows visitors to suggest, and vote on things they want to see improved. In the *UserVoice* feedback, making it easier to insert links (and annotations) was the suggestion that received most votes (five of them; second on the list was explaining LogiLogi by making a screencast).

Initially, after going to the insert-page, users had to begin by selecting a range of text, and only then they could create their annotation, or reply. But this tended to confuse users, as some started to type an annotation directly into the text they wanted to comment on (see figure 25). Thus the order has now been reversed, with the annotation being created before the range has to be selected (figure 26). Sadly enough, allowing users to insert an annotation directly while reading a logi (without going to a new page), while technically possible, appeared to be too hard to accomplish within the time available.

Another improvement in interactivity is that users now see *'Attach (logi) to phrase'* buttons below their own replying logis and re-
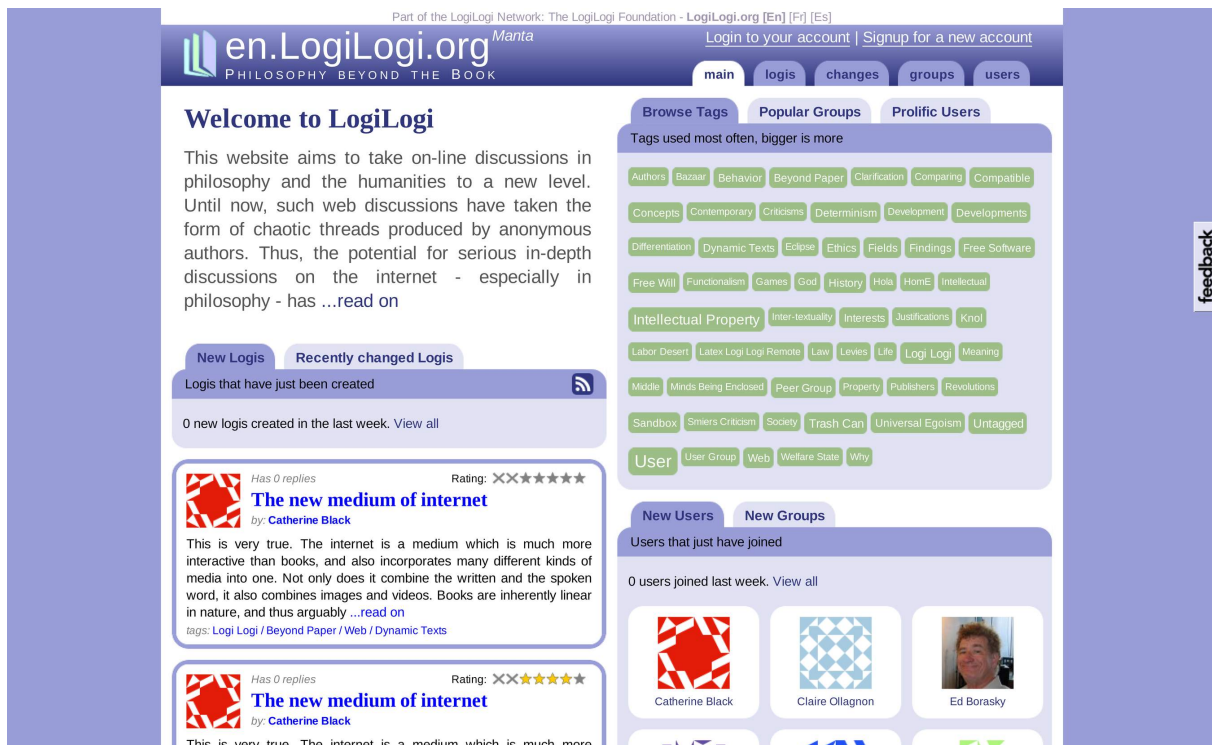
Figure 19: *Before: The main page as it was in September 2009.*



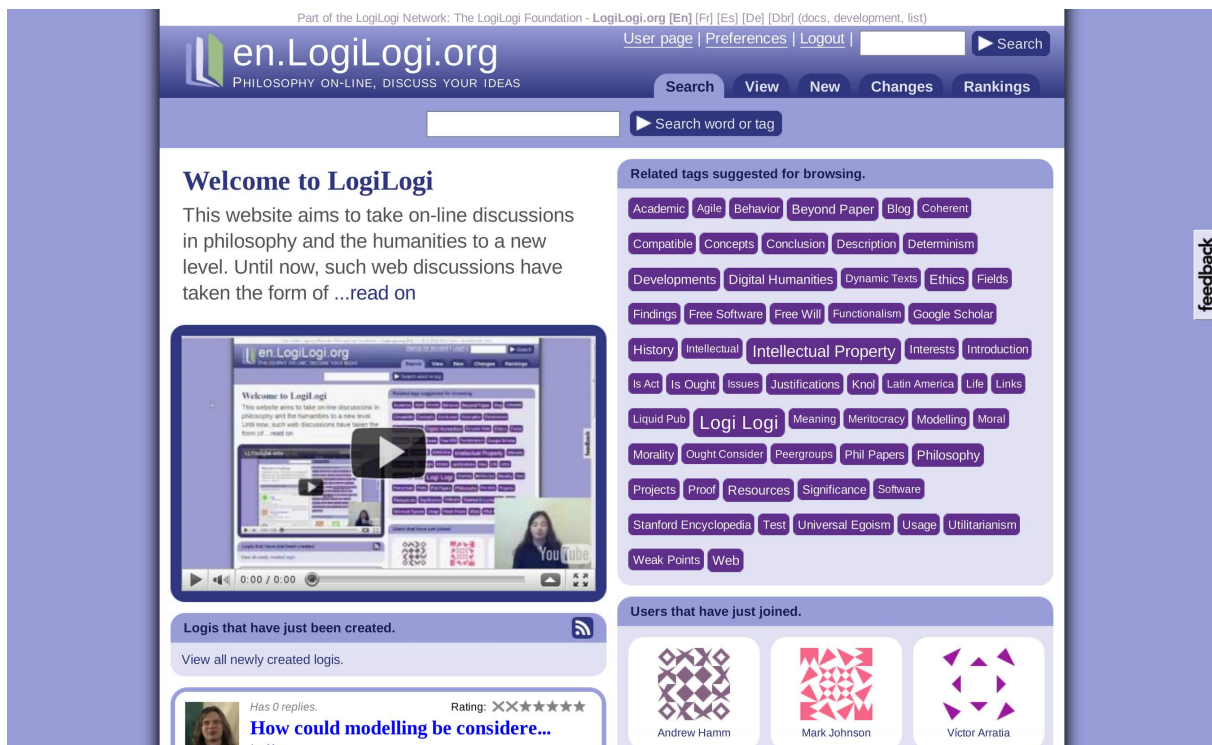Figure 20: *After: The new mainpage with an introductory screencast.*

Figure 21: *View logi page with links (dark blue), an unresolved link (dark red), and annotations (dark green).*

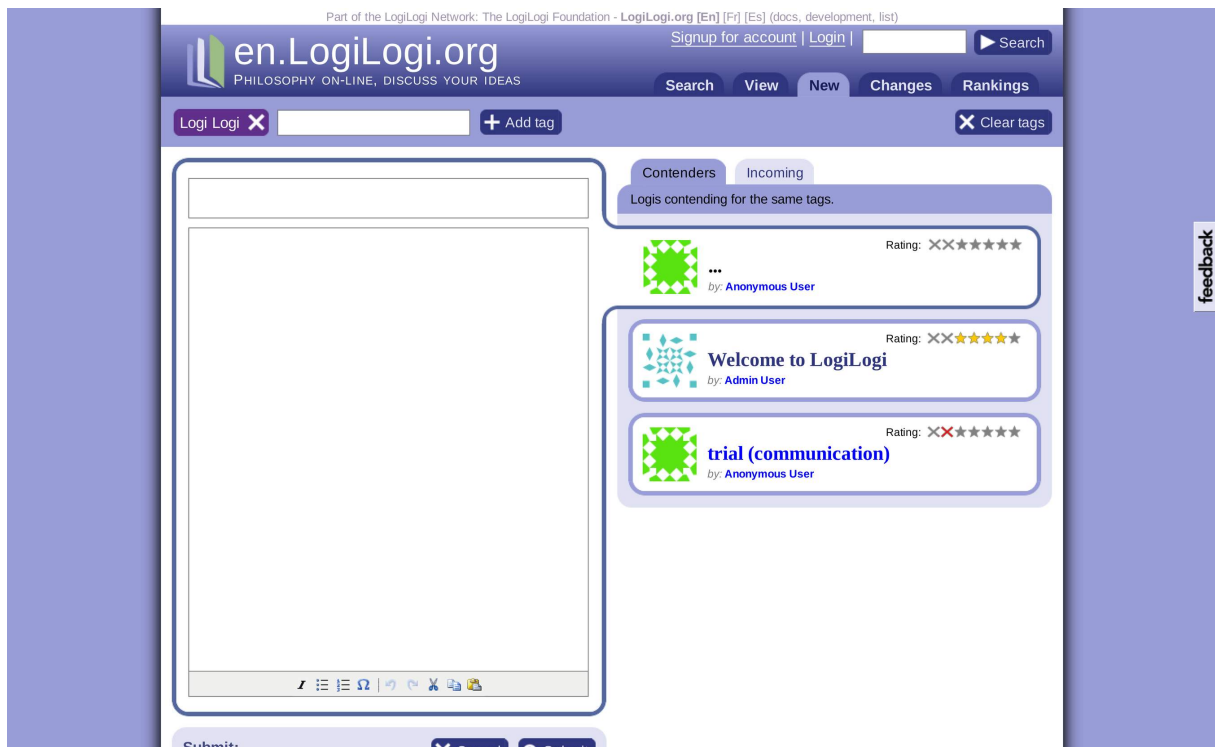Figure 22: *Before: Create logi page, confusingly different from the view page.*

Figure 23: *After: Creation page providing the illusion of in-place creation.*



Figure 24: *After: Creation page explaining the usage of, and need for tags.*

Figure 25: *Before: First select the text, then write the annotation.*

Figure 26: *After: Order reversed, first write the annotation, then select a phrase.*

marks. These make it possible to attach remarks or replying logis to a phrase after they have been saved, allowing for a gentler learning curve. See figure 27 for the view page without buttons, and figures 28 and 2 for the new situation.

Besides UI-wizzardry, allowing people to moderate and rate things is another aspect of interactivity. As noted, LogiLogi has an elaborate voting-system which literally gives authors control. It might even be too complicated, as choosing between seven (-2 up to 5) options requires more thinking than a simple up, or down-vote, causing people to vote less.

Finally, commenting, and replying to replies of others through threads, is another form of interactivity. Threads in forums focus attention and make replying extremely easy. This lowers the threshold for interacting, and thus increases interactivity.[55] Yet LogiLogi is notably lacking threads. And apart from adding remarks and annotations, which allow people to post a few words or a single sentence, nothing more was done about it. This because not having threads was a conscious choice when LogiLogi was first conceived. Threads tend to fragment discussions, stand in the way of in-depth conversations, and finally, not having them would make LogiLogi more journal-like. Of course it is still possible that interactivity might have been reduced too much by this.

### 5.3 Sociability

Sociability is a term akin to usability, which was proposed by Jenny Preece. Instead of being about interacting with the software, it is about interacting with others, across the software. It mostly refers to the degree to which the community is supported and safe-guarded by the application and its policies.[67]

As Preece has formulated it, it encompasses first of all the purpose of the application: What is it for and why would people want to be there? Secondly, the kind of people that are there, their attitudes, or sub-culture, and their

mutual support and openness towards newcomers are important.[5] And the third factor are the policies that govern the community (or allow it to govern itself).[48]

If these things are done wrongly, it is hard for a community to grow, or to continue to flourish.[52] *Facebook* for example, had many users leave over their new privacy policy in May 2010.[15,30] Other things that could go wrong in the social sphere, and put off users or newcomers, are: not responding to e-mails in time, and showing hostility towards (seemingly) stupid questions asked by newcomers. This also ties in with usability, as ideally the software should be self-explanatory.

LogiLogi seems to do relatively well on sociability. The few e-mails with questions sent to us have received quick replies. And as an Open Source project it is owned by its user-community, and we even promised users the possibility to take all their data with them if they want. Nevertheless actually implementing such export-functionality might improve sociability further (though nobody has asked for it so far). Though it is doubtful if users really value such things.

### 6 Value: What is in it for the user?

What value the user can derive from LogiLogi, both in the short and long term, is now looked at. Parts are: content, credibility, and rewards.

### 6.1 Content

It is important, first of all, that there is enough content on the site, and that it is of sufficient quality. As LogiLogi is specifically designed for new contributions, about eighty previously unpublished philosophical essays have been added as seed-content. These essays are mostly my own writings (some of which are part of larger essays). As it arrives, the advantage of content written by readers, such as that on *Wikipedia*, is that it reflects the interests of those readers likely to become
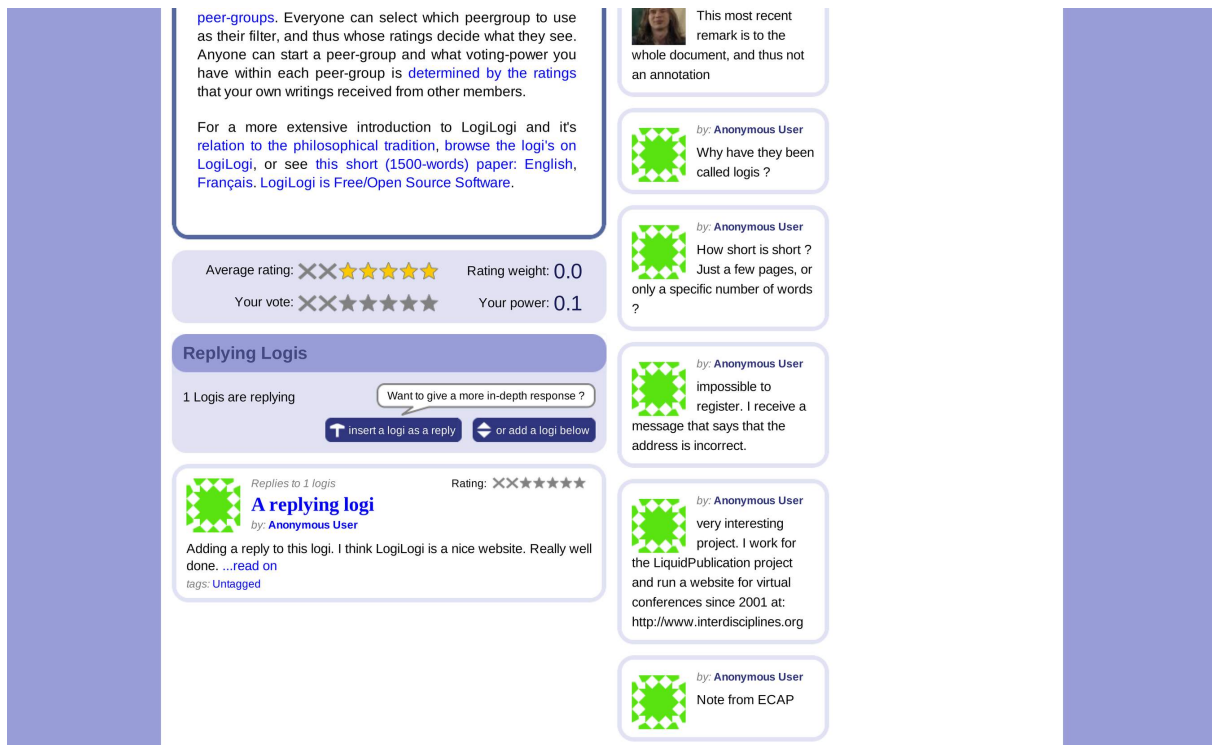
Figure 27: *Before: No attach buttons.*

Figure 28: *After: Attach buttons for remarks and replies created by anonymous users.*

contributors. LogiLogi eventually hopes to reap this benefit as well.

It was found by Gaowei Chen[16] that on the web disagreement triggers increased responses, instead of inhibiting the conversation (which happens in face to face contexts). Thus, a surprising problem with the added essays might be that, while their quality is presumably reasonable for the web, they are relatively nuanced. Therefore a few controversial texts were added as well (on utilitarianism and the overcomplexity of many digital publishing applications).[92,93] In addition, adding functionality for discussing propositions in a polarized way, was considered, and proposed to the participants in the usability studies. But as noted, it was not considered a good idea.

In relation to content, the shape of the *production function* is also important. It delineates where the problem of producing texts, links and other community assets lies. If it is decelerating, it is easy to get people to create the first few texts, but then, as there are more texts, people see less value in adding new content. In this case there will be no start up problem, but a maintenance problem. While, if the production function is accelerating, then gaining critical mass is hard, but once it is attained, more and more content will be added (self sustained growth).

In *Wikipedia*, for example, the production-function is accelerating. As the quality of articles increases, there will be more visitors, and more people will be motivated to add or improve articles.[13] While in threaded web-forums a new reply to a thread that is already very long, is less likely to be read or valued, and thus in forum-threads the production function is expected to be decelerating (at least above a certain size).[65,66] We expect the production function of LogiLogi to be slightly accelerating, but less so than that of *Wikipedia* (as LogiLogi contains forum-like features).

## 6.2 Credibility

An application can also be helped a lot by it having credibility. Credibility can come from a project being affiliated with, or subsidised by a reputable institution, as well as from personal recommendations by so called stars (highly respected persons in the relevant community).[43,82] Credibility is a weak spot for small projects such as LogiLogi. The (modest) grants we have received from institutions so far, have improved this a bit, as grants are generally seen as tokens of endorsement. To make this support clearly visible, banners of the institutions that have supported LogiLogi so far, are shown in the footer of the site. Our collaboration with Der Blaue Reiter is positive in this way as well.

Credibility is also valuable for generating the shared expectation that an application will be taken up by many people. E.g. that it will gain critical mass. If the user thinks that his contribution will generate a return on investment (be noticed, commented on, etc.) he will likely contribute. Critical mass thus often is a self-fulfilling prophecy.[3] As it is about perception, making user-activity visible can help as well, but only once the application has gained traction.[7] Before that it has the opposite effect, and therefore we temporarily removed the statistics (number of new users and logis) from the homepage (figure 20).

An application being useful and presentable at a small scale also helps. Even a very small *Wikipedia*, for example, could already be considered a success, as encyclopaedias come in varying sizes.[20]. Other ways to make an application seem more credible are various, but in general making it look old and traditional, or making it mimic the thing it tries to improve upon, can be a good idea. The French Minitel (fore-runner of the internet) for example, looked like a traditional telephone.[3] Similarly we tried to subtly improve LogiLogis credibility by having scenes from Oxford in the background of the intro-

ductionary screencast.

But on the other hand, an application should also not seem too pretentious. According to Andrew Dalby one reason why *Wikipedia* attracted so many authors, was that it started out as an informal drafting-platform for the more daunting *Nupedia* project (which had traditional editors, etc.).[59,20] So a balance has to be sought here. To make LogiLogi less high-brow (more informal), many references to philosophy were removed, and replaced by more inviting things such as *'discuss your ideas'*.

Another improvement is that user-pages were made more like blogs. Blogs are a known medium on the web, and provide users with their own space on LogiLogi. Initially, user pages were normal logis where users could describe themselves. They had an extra box at the side showing some stats on the user (*'Activity'*, figure 29). Such pages still exist, but visitors now land on a logi-blog, after clicking on an user-name (figure 30). Here recent logis by the user are shown, and remarks can be posted to their wall. Also, a small snippet from the (old) user-page is now shown at the right side. This improvement was suggested by David Bourget during the *London Seminar in Digital Text and Scholarship*. The idea was presented for feedback during the second usability test, and received positively.

### 6.3 Rewards

Another important success factor is that of rewards. Publishing in academic journals is tightly integrated with career advancement, almost to the extent of it being a social chain. Compared to this, web-communities can offer much less. Though it is likely that this will (or at least can) change, as IT-professionals already receive career-benefits from web-communities.

Other forms of rewards are rankings and reputation-points. These can signal the reputation of members, and thereby motivate ex-

cellent community-members.[17,31] In addition, as Gerard Beenen has demonstrated, things such as simply assigning people to teams (even if just in name), and inducing competition between these teams, can make people more productive community members.[9] Though, given the individualistic nature of philosophical work, putting people in teams might be less useful for LogiLogi.

An important way to make virtual rewards more rewarding is by making them more recognizable. So instead of a karma number that goes up from zero to a hundred, creating a small set of classes of expertise, mimicking those in society (such as layman, student, postgraduate, etc...), is more effective.[5] The gradual ranking of authors on LogiLogi therefore was a weak spot. Thus we have made the rankings-page more distinctive and tangible with golden, silver, and bronze laurels, and terms such as 'good', 'excellent', and 'unsurpassed' (using academic titles seemed too pretentious).

The changes can be seen in figure 32, where in addition to the rankings, the right column displays a listing of the best rated logis on overall (regardless of their tags). The initial situation is shown in figure 31, with rankings in an *'Activity'* box.

In terms of rewards, traditional publications unquestionably have more to offer. But LogiLogi avoids head-on competition with journals by being narrowly defined (for small texts, and for use at the side). Also journal papers take more work to complete, and have publication-cycles of many months, if not years. More on competition now.

## 7 Market: What are other projects doing?

We will now analyse to what extent there is a void in the market for LogiLogi: the competition, network effects, and timing.

Figure 29: *Before: User-pages as they were.*



Figure 30: *After: A logi blog user-page, showing the users most recent logis.*
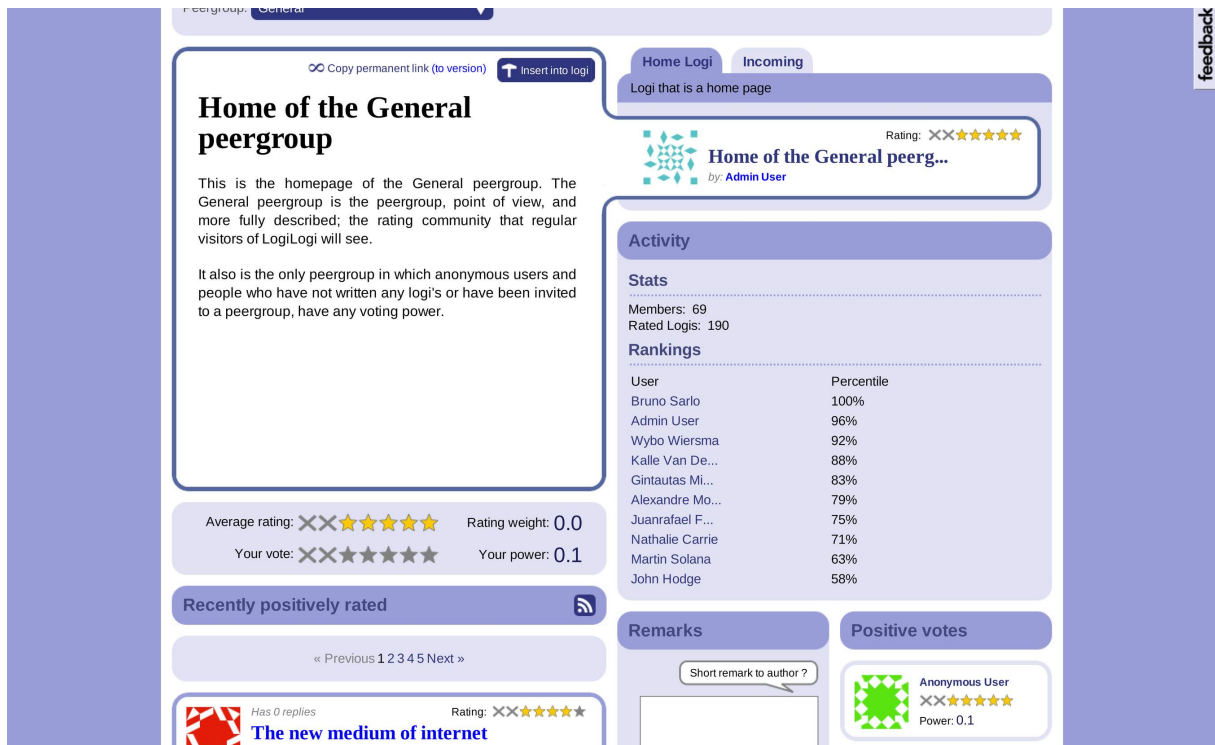
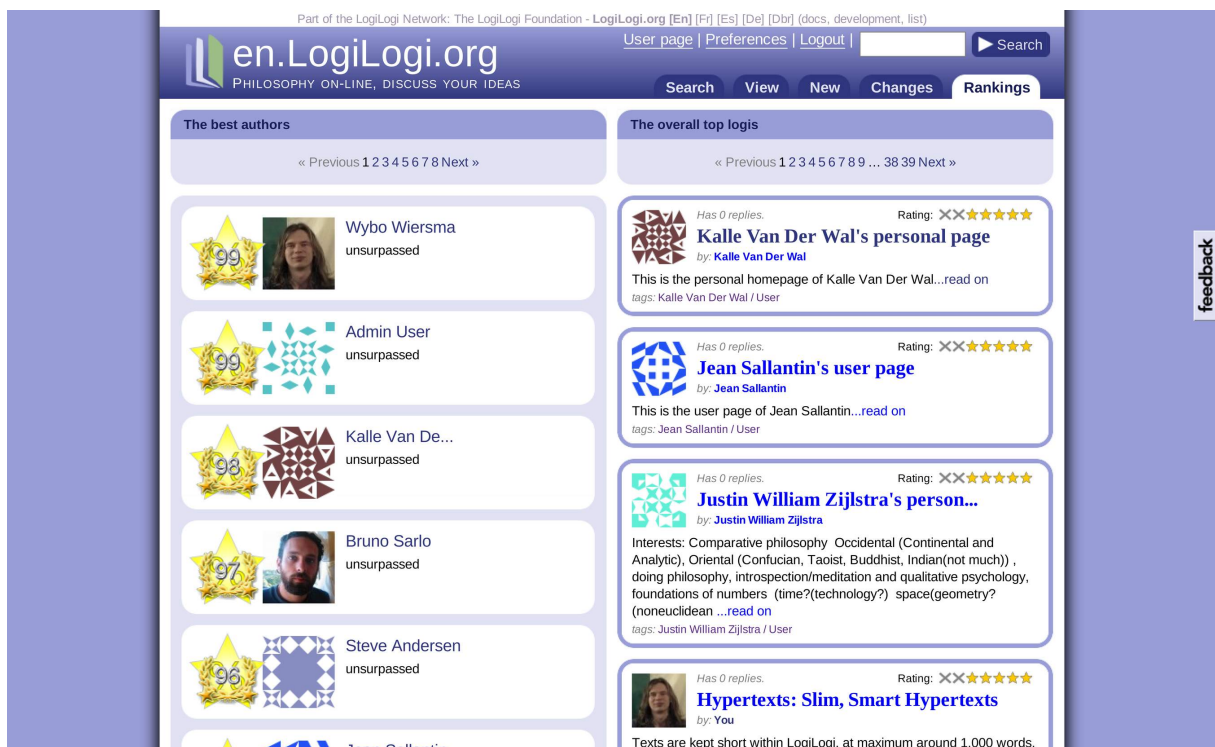Figure 31: *Before: Rankings on a peergroup page (a normal logi with an extra box, just like user pages).*



Figure 32: *After: The new rankings page, with visible distinctions.*

## 7.1 Competition

Competing projects are projects that target the same audience (audience including, or overlapping with ones intended audience) and that do this from the same angle (that offer a similar service). A limited pool of users will make their pick based on how well all projects are doing with regard to the previously discussed attention points.

The closest competition for LogiLogi is formed by PhilPapers.org and LessWrong.com (figures 33 and 34). PhilPapers indexes journal papers, provides alerts of new publications, and has an user-forum. The site is doing well, and has over 10.000 users (many of which are academic philosophers). Yet its forum currently does not have critical mass. LessWrong is a community blog devoted to philosophy of technology (thus targeting technophiles), and affiliated with the future of Humanity Institute of the University of Oxford. It looks promising, and has attained a small critical mass in the above mentioned sub-discipline.

The wider playing-field is mostly determined by journals on one side, and blogs and forums on the other. It remains to be seen if they leave room for a medium in the middle. Various rating-sites exist for blogs and blog-posts, such as *Technorati*, *Digg* and *Reddit*. And academic publishers such as Elsevier and Springer are also dipping their toes into the internet, with projects such as *2Collab* (shared bookmarking for academics), *CiteULike* (expressing favourites among papers) and LiquidPub (dynamically updated papers that can be recombined).[80,23,69,1,18,6]

Lack of competition on the other hand, can also signal that an idea is not viable. And this can be for three reasons: first of all that the intended audience has no money to spend, and it thus has not attracted commercial attention (true for Philosophy, but not fatal for Digital Humanities projects), secondly, that the idea is so bad that nobody would be interested in

using it, or thirdly, so hard to introduce, that nobody was brave (or naïve) enough build it. It is not just failed projects that one can learn from, but also those that are not being attempted.[12]

Another surprising way in which competition can come into the equation is internally, between communities within the website itself. If the initial user-community of a website is divided up too much, critical mass might not appear where it otherwise would have been reached. This problem is sometimes seen on new sites offering traditional web-forums. In an attempt to suggest topics or to create some order, ten or so deserted sub-forums are created, instead of a single one, which might have attained critical mass.

Now it was the case that LogiLogi had — what we called — *peergroups* until the summer of 2009. They basically were duplications of LogiLogis rating-system. Thus contributions could have multiple ratings, authors did not have the same voting-power within each *peergroup*, and visitors could pick a peergroup to use as a filter. By allowing for this, peergroups were dividing the userbase. To quickly improve LogiLogis chances of attaining critical mass we therefore temporarily disabled its multiple peergroup-system.

## 7.2 Network effects

As already explained, a web-application displays network effects if new users benefit from the presence of existing users. But there is more to them. Network effects create a *winner takes it all* situation. Even if the dominant application is less user friendly, or less good in other respects, it nevertheless will continue to dominate the market.[33]

When we find competing web-applications with similar market-shares, these can be considered to be at a so called bifurcation-point in their race for take-up. A bifurcation point (a notion from physics) is a point at which a process can seemingly randomly go into one of two directions.[8] Bifurcation points are
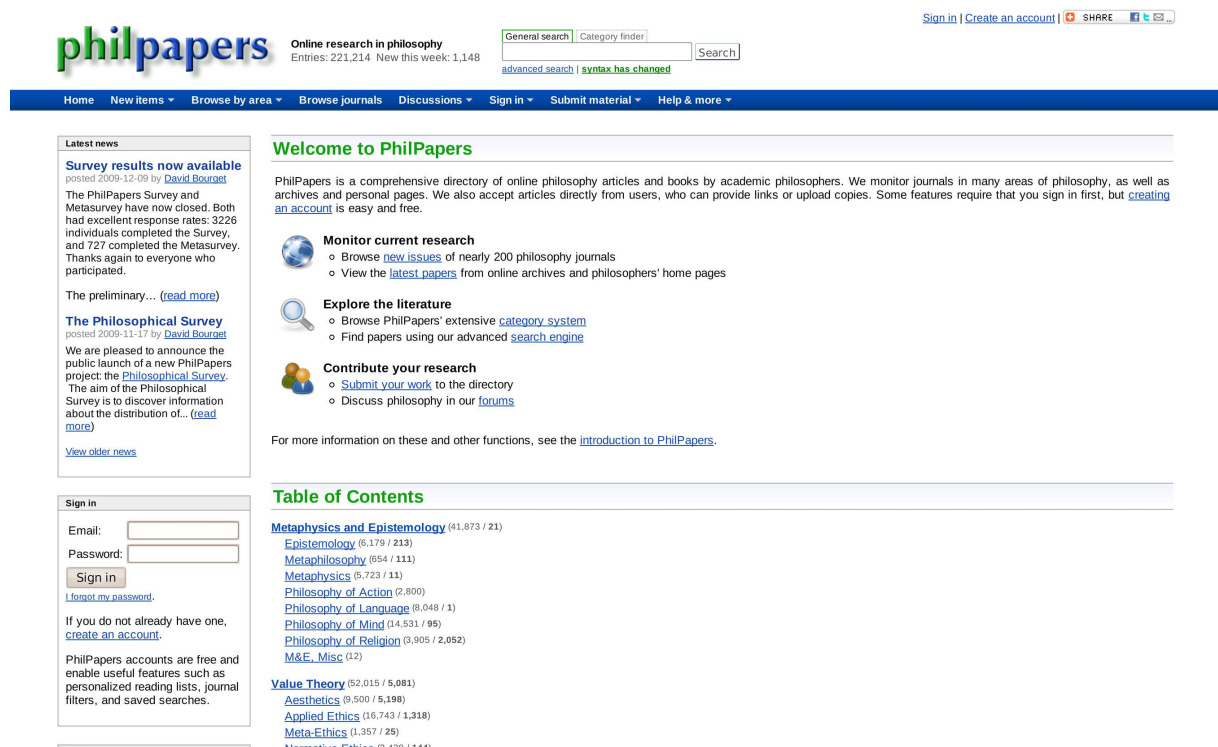
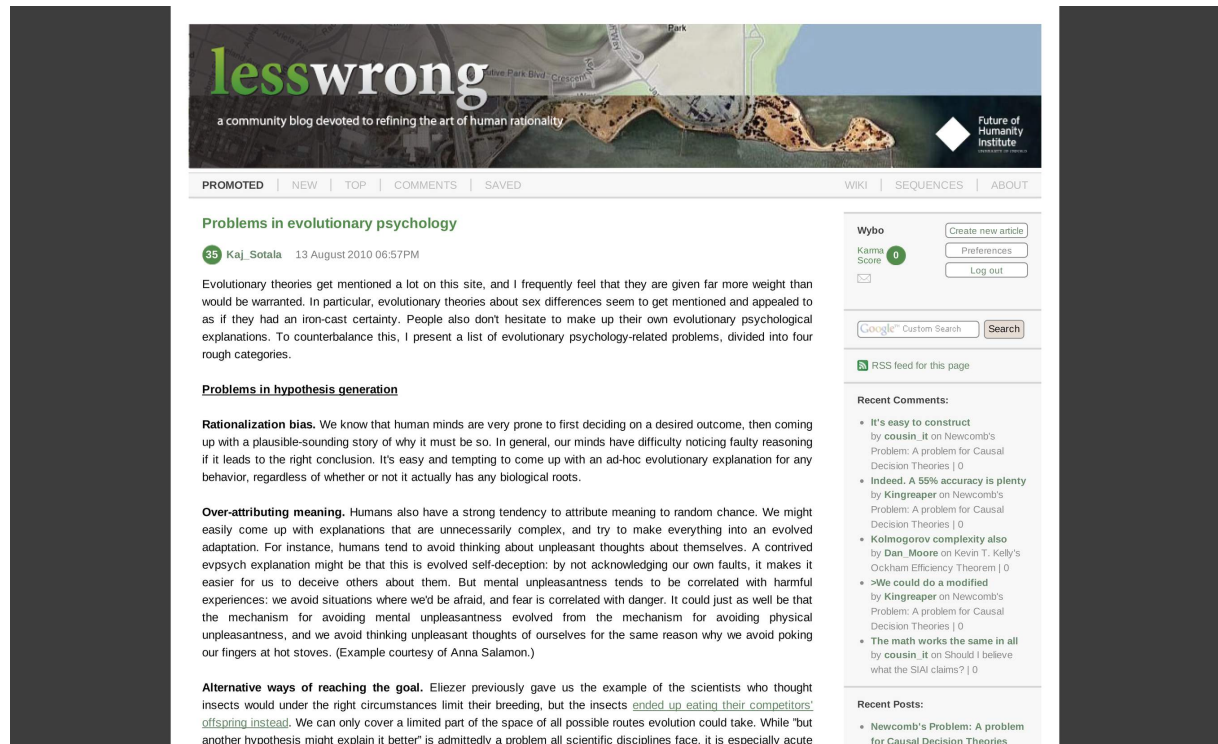Figure 33: *The PhilPapers.org website.*



Figure 34: *The LessWrong.com website.*

Figure 35: *A listing of the peergroups existing in 2009.*

unstable, while the other two extremes of zero users, and full coverage are stable (self-reinforcing). This makes that early leads can be very important.[76,34]

In most cases, however, the ground of a newly introduced application is at least partially covered by something already. And in practice, even network monopolies are sometimes overcome (the growth of initially tiny *Facebook* versus *MySpace* is an example).[56,15] For this to happen it is important that the new application offers a genuine advantage, and preferably also has one or more core features that make it useful on its own, before critical mass is attained.[96,73,83]

The tagging site *Delicious* is an example of this.[21] Its main feature was that it allowed individuals to organize their personal links in one place, and access them from multiple computers. Only later it became a community.[77] The problem with LogiLogi is that it is not terribly useful if nobody else is using it. At best it might then be useful for organizing

ones own ideas; a thing on which we might put more emphasis in the future.

### 7.3   Timing

The final factor that explains success at attaining critical mass is timing. Not just against the competition, but also with regard to people, or society, being ready for it. Pioneers such as Vannevar Bush, Douglas Engelbart (inventor of the mouse and much more) and Ted Nelson (who coined the term hypertext, and predicted the internet in the 1960's) had what were good ideas in hindsight.[14,24,58,68] Their market was free from competition, yet their projects mostly failed.[44] They were too far ahead of their time. The mindset required to share their visions, as well as a lot of infrastructure, had not yet developed in society.

They would have been instantly successful had they hit upon a so called meta-stable state (the notion comes from physics as well).[8,28] It denotes a state in which a system that is seemingly stable, is in reality very sensitive to be-

ing tipped over into another state. An example of such a system is a busy highway at which all cars move at full speed. Then if one car slows down to take an exit-lane, the cars behind it will brake, likely over-compensating, and a traffic-jam will result.

Meta-stable systems can be seen as low hanging (but hard to spot) fruit. They can stay in their stable state for a long time, ready to be tipped. In terms of social traps they are closest to a missing hero type social trap. The existence of meta-stability, more even than bifurcation points, explains why timing and luck can be such important factors in the success of applications.

It seems as if, apart from changing ones global aims, or entering into a new market, not much can be done to manouver towards meta-stable states. The faltering text-based game *Flickr*, for example, turned itself into a successful photo site when they stumbled upon an easy method for uploading pictures.[39,32] Yet there are some other things that can be done: Using ones limited means well, being agile, and going a long way with little code.[2,63,62]

With this in mind LogiLogi was designed as a singular site (like *Wikipedia* or *Facebook*). It does not provide a federative, or peer-to-peer structure. Both the simple architecture that results from this, and the use of a high level programming language, mean that updating, improving, and adapting it, are as easy and swift as they can be. Moreover, keeping the site singular also gives users the full advantages of forming a global community, and thus a maximum of network-effects.[94]

LogiLogi also does not aim to be a fully fledged publishing framework, a conference-tool, an universal library, or a replacement for all uses of wikis and mailing-lists. It does not even try to hook into existing institutions, nor to replace any part of the journal-based publishing ecosystem. LogiLogi tries to avoid the mistake of trying to do everything, but nothing

really well. Though this was no guarantee for success, it has at least allowed us to move and adapt (relatively) quickly. If there had been a meta-stable state awaiting web-based, philosophical, micro-publications, then we would have caught it.

## 8   Conclusion

To conclude, we have first defined critical mass as exceeding a threshold of users required for an active community, followed by a thorough description of the LogiLogi platform. Then our two usability studies were described. This was followed by a discussion of twelve success-factors important for the attainment of critical mass, in four blocks of three: First we looked at the importance of choosing a web-savvy audience, hooking into peoples mailboxes, and viral marketing ('Outreach'). Then at ways to lower the learning-curve, to make LogiLogi more interactive, and more sociable, were examined ('Atmosphere'). Following, the right seed-content, credibility derived from affiliations, and motivating users through rewards, were discussed ('Value'). Finally the competition, monopolies resulting from network-effects, and starting at the right time, were analysed ('Market'). Improvements we implemented were presented and justified along the way.

Sadly enough we have not been able to implement all possible improvements. For example, the voting-system was not simplified, annotation was made easier, but not as easy as it could have been, and no support for the Opera browser was attained. Other improvements were only finished relatively late, such as the weekly mailings, the attach buttons, badges, and support for Google Chrome. Nevertheless LogiLogi should be ready for wider use now, and much better equipped to gain critical mass.

And while it is still possible for LogiLogi to attain critical mass, it is increasingly unlikely that this will ever happen. The competition may be relatively slim so far, but that

likely is because of the impossibility of the undertaking. The social chain that keeps paper journals (and pdf-based ones) linked with academic success might still be so strong as to even stifle projects that don't directly compete with them. For example, by making it not even worth an afternoon of work to publish something on the web, if that afternoon could also be spent doing 1/40th of the work required to write a full paper. The chain will loosen, no doubt, but it might take another decade, or more. At which time LogiLogi is not competitive any more, given that it is a small project, only ran by a couple of volunteers, and mostly coded by me. Keeping up with increasing usability expectations on the side of potential users, and with changes in browser technology (such as HTML 5), is going to be hard.

As for the lessons learned from this attempt, and the development of LogiLogi in general, one should first of all, always start with the user-interface if one designs a web-platform. Intricate data-structures might be pleasing to the technically inclined mind, but users need intuitive buttons and a gentle learning-curve. Secondly, start simple. LogiLogi could have been 90% of what it is today from an users perspective, with 20% of the work. Explanatory screencasts, frequent mailings and updates are also something which should be done early on. People don't invest in understanding something before they understand its value. And finally, technology is not everything. Social practices make all the difference.

The social aspects of collective technology adoption are among the hardest problems I have encountered so far. And it is not possible for LogiLogi and similar projects to succeed without a better understanding of critical mass. There is very little academic literature available on critical mass. More research should be done. It would be particularly useful to study the process of attaining critical mass in web-platforms that have

succeeded. A more rigorous, quantitative approach would be to match the growth-patterns as derived from server-logs to a mathematical model, or simulation of the appearance of critical mass. This would likely enable us to identify the relative importance of the various factors.

In my coming year at the *Oxford Internet Institute* I hope to complete such a study. And it is not just projects such as LogiLogi, but the whole of the Digital Humanities that could benefit from such research. The wider web world and society also stand to gain. Millions of pounds currently invested into failing web-projects could be used more effectively with a better understanding of critical mass.

## 9   Acknowledgements

Lavagnino for the guidance and supervision that made this paper possible.

In addition, we would like to thank the audiences of our presentations at the *FOSDEM* of 2007 and 2009 in Brussels, the *TDOSE* of 2007 in Eindhoven, the Netherlands, the *ECAP* conferences of 2008 and 2009 in Montpellier and Barcelona, the *DH2008* and *2010* conferences, the *RMLL* of 2008 in Mont-de-Marssan, France, the *FKFT* of 2008 in Barcelona, the Philosophers Rally of 2009 in Enschede, the Netherlands, the *Second Workshop on Scientific Knowledge Creation, Dissemination, and Evaluation* 2010, in Ovronnaz, Switzerland, the *London Seminar in Digital Text and Scholarship*, and those at the *Centre for Computing in the Humanities* at *King's College London*, for their ideas, questions and insightful comments.

This paper is available under the Creative Commons Attribution-Share Alike License, version 3.0.

## Bibliography

1. *2Collab.* <`http://www.2collab.com/`>.

2. Abrahamsson, P., Salo, O., Ronkainen, J., & Warsta, J., 'Agile software development methods: review and analysis.', *VTT Publications 478* (2002).

3. Allen, D., 'New telecommunications services: network externalities and critical mass.', *Telecommunications Policy* 12, 257–271 (1988).

4. Andrews, D., & Preece, J., 'A conceptual framework for demographic groups resistant to online community interaction.', *Proceedings of the 34th Annual Hawaii International Conference on System Sciences* 7, 7013 (2001).

5. Anglin, T., *Community 2.0: the recipe for a successful online community.* <`http://aspalliance.com/articleViewer.aspx?aId=1428&pId=-1`>.

6. Baez, M., & Casati, F., 'Liquid journals: knowledge dissemination in the web era.', *LiquidPub Site* (2009).

7. Bailor, C., *Best practices: 10 tips to online community success.* <`http://www.destinationcrm.com/Articles/CRM-News/Daily-News/Best-Practices-10-Tips-to-Online-Community-Success-41884.aspx`>.

8. Ball, P., *Critical mass: how one thing leads to another.* (Arrow Books Ltd, 2005).

9. Beenen, G. *et al.*, 'Using social psychology to motivate contributions to online communities.', *Proceedings of the 2004 ACM conference on Computer supported cooperative work* 221 (2004).

10. Bhargava, R., *10 secrets of successful online community.* <`http://www.socialmediatoday.com/SMC/2348`>.

11. Bishop, J., 'Increasing participation in online communities: a framework for human-computer interaction.', *Computers in Human Behavior* 23, 1881–1893 (2007).

12. Brice, A., *Lessons learned from 13 failed software products.* <`http://successfulsoftware.net/2010/05/27/learning-lessons-from-13-failed-software-products/`>.

13. Buriol, L. S., Castillo, C., Donato, D., Leonardi, S., & Millozzi, S., 'Temporal analysis of the wikigraph.', *IEEE/WIC/ACM International Conference on Web Intelligence, 2006. WI 2006* 45–51 (2006).

14. Bush, V., 'As we may think.', *Library computing: internet & software applications for information professionals* 180 (2000).

15. Carlson, N., *How facebook was founded.* <`http://www.businessinsider.com/how-facebook-was-founded-2010-3#they-made-a-mistake-haha-they-asked-me-to-make-it-for-them-2`>.

16. Chen, G., & Chiu, M., 'Online discussion processes: effects of earlier messages' evaluations, knowledge content, social cues and personal information on later messages.', *Proceedings - Sixth International Conference on Advanced Learning Technologies, ICALT 2006* 2006, 756–760 (2006).

17. Cheng, R., & Vassileva, J., 'Design and evaluation of an adaptive incentive mechanism for sustained educational online communities.', *User Modeling and User-Adapted Interaction* 16, 321–348 (2006).

18. *CiteULike: Everyone's library.* <http://www.citeulike.org/>.

19. Cohen, A., *Characteristics of successful online communities.* <http://www.idealware.org/articles/successful_communities.php>.

20. Dalby, A., *The world and Wikipedia: how we are editing reality.* (Siduri Books, 2009).

21. *Delicious.* <http://delicious.com/>.

22. *Diff longest common substring - Gem documentation.* <http://difflcs.rubyforge.org/>.

23. *Digg.* <http://digg.com/>.

24. *Doug Engelbart Institute.* <http://dougengelbart.org/>.

25. Economides, N., & Himmelberg, C., 'Critical mass and network size with application to the us fax market.', (1995).

26. *Een website met diepgang - Interview on Dutch philosophy blog.* <http://filosofienu.wordpress.com/2010/07/16/een-website-met-diepgang/>.

27. Elam, C., Stratton, T., Hafferty, F., & Haidet, P., 'Identity, social networks, and relationships: theoretical underpinnings of critical mass and diversity.', *Academic Medicine* 84 (2009).

28. Evans, M., *What makes a new service sticky?* <http://www.markevanstech.com/2007/08/03/what-makes-a-new-service-sticky/>.

29. *Facebook.* <http://www.facebook.com/>.

30. *Facebook reveals 'simplified' privacy changes - BBC News.* <http://www.bbc.co.uk/news/10167143>.

31. Farzan, R., DiMicco, J. M., & Brownholtz, B., 'Spreading the honey: a system for maintaining an online community.', *Proceedings of the ACM 2009 international conference on Supporting group work* 31–40 (2009).

32. *Flickr! - Photo sharing.* <http://www.flickr.com/>.

33. Fullerton, H., 'Microeconomic theory and critical mass.', *Telecommunications Policy* 13, 167–168 (1989).

34. Gladwell, M., *The tipping point: how little things can make a big difference.* New edition (Abacus, 2002).

35. Goidel, R. K., & Shields, T. G., 'The vanishing marginals, the bandwagon, and the mass media.', *The Journal of Politics* 56, 802–810 (2009).

36. Goldenberg, J., Libai, B., & Muller, E., 'The chilling effects of network externalities.', *International Journal of Research in Marketing* (2009).

37. *Google Buzz.* <http://www.google.com/buzz>.

38. *Google Wave.* <http://wave.google.com/intro2.html>.

39. Graham, J., *Flickr of idea on a gaming project led to photo website.* <http://www.usatoday.com/tech/products/2006-02-27-flickr_x.htm>.

40. Guilizzoni, P., *Balsamiq blog: bootstrapping a micro-isv, exposed.* <http://www.balsamiq.com/blog/2008/08/05/startup-marketing-advice-from-balsamiq-studios/>.

41. *Hacker News.* <http://news.ycombinator.com/>.

42. Hars, A., & Ou, S., 'Working for free?: Motivations for participating in open-

source projects.', *International Journal of Electronic Commerce* 6, 25–39 (2002).

43. Katz, M. L, & Shapiro, C., 'Network externalities, competition, and compatibility.', *The American economic review* 424–440 (1985).

44. Kolb, D., 'Association and argument: hypertext in and around the writing process.', *The new review of hypermedia and multimedia : applications and research* 7–26 (2005).

45. Krug, S., *Don't make me think: a common sense approach to the web.* (New Riders Publishing Thousand Oaks, CA, USA, 2005).

46. Kuniavsky, M., *Observing the user experience: a practitioner's guide to user research.* 1st ed. (Morgan Kaufmann, 2003).

47. Latour, B., *Science in action : how to follow scientists and engineers through society.* (1987).

48. Lazar, J., & Preece, J., 'Social considerations in online communities: usability, sociability, and success factors.', *Cognition in a digital world* 127–151 (2002).

49. Leimeister, J. M, Sidiras, P., & Krcmar, H., 'Success factors of virtual communities from the perspective of members and operators: An empirical study.', *Proceedings of the 37th Hawaii International Conference on System Sciences* 7 (2004).

50. Liebowitz, S. J., *Network externalities.* <http://www.utdallas.edu/~liebowit/palgrave/network.html>.

51. Liebrand, W. B., 'A classification of social dilemma games.', *Simulation and Games* 14, 123–138 (1983).

52. Lin, H., Fan, W., Wallace, L., & Zhang, Z., 'An empirical study of web-based knowledge community success.', *System Sciences, 2007. HICSS 2007. 40th Annual Hawaii International Conference on* 178c–178c (2007).

53. *LogiLogi.org - Philosophy on-line, discuss your ideas.* <http://en.logilogi.org>.

54. *LogLog.org - Updates, your way.* <http://log.logilogi.org/>.

55. Miller, R., *Five rules for building a successful online community.* <http://www.ojr.org/ojr/stories/060831miller/>.

56. *MySpace.* <http://www.myspace.com/>.

57. Nadeau, R., Cloutier, E., & Guay, J., 'New evidence about the existence of a bandwagon effect in the opinion formation process.', *International Political Science Review* 14, 203–213 (1993).

58. Nelson, T. H., *Literary machines : the report on and of, project Xanadu, concerning word processing, electronic publishing, hypertext, thinkertoys ...* (1992).

59. *Nupedia history on Wikipedia.* <http://en.wikipedia.org/wiki/Nupedia>.

60. O'Hear, S., 'Critical mass.', *Times Educational Supplement* 74 (2004).

61. Oliver, P. E., & Marwell, G., 'Whatever Happened to Critical Mass Theory? A Retrospective and Assessment.', *Sociological Theory* 19, 292–311 (2001).

62. OReilly, T., *What is Web 2.0: Design patterns and business models for the next generation of software.* <http://www.oreillynet.com/lpt/a/6228>.

63. Papadimoulis, A., *The great pyramid of agile - the daily wtf.* <http://thedailywtf.com/Articles/The-Great-Pyramid-of-Agile.aspx>.

64. Platt, J., 'Social traps.', *American Psychologist* 28, 641–651 (1973).

65. Prasarnphanich, P., & Wagner, C., 'Creating critical mass in collaboration systems: insights from Wikipedia.', *2nd IEEE International Conference on Digital Ecosystems and Technologies, 2008. DEST 2008* 126–130 (2008).

66. Prasarnphanich, P., & Wagner, C., 'Explaining the sustainability of digital ecosystems based on the wiki model through critical mass theory.', (2009).

67. Preece, J., 'Sociability and usability in online communities: determining and measuring success.', *Behaviour & Information Technology* 20, 347–356 (2001).

68. *Project Xanadu: founded 1960: the original hypertext project.* <http://www.xanadu.net/>.

69. *reddit.com: what's new online!* <http://www.reddit.com/>.

70. Reed, M., *When can online communities be declared a success?* <http://www.communityspark.com/when-online-communities-successful/>.

71. Rubin, J., & Chisnell, D., *Handbook of Usability Testing: Howto Plan, Design, and Conduct Effective Tests.* 2nd ed. (Wiley, 2008).

72. *Ruby on Rails.* <http://rubyonrails.org/>.

73. Santos-Neto, E., Condon, D., Andrade, N., Iamnitchi, A., & Ripeanu, M., 'Individual and social behavior in tagging systems.', *Proceedings of the 20th ACM Conference on Hypertext and Hypermedia* 183–192 (2009).

74. *Slashdot Stories.* <http://slashdot.org/>.

75. Smith-David, J., 'Social networks on both sides of the transition point.', *Electronic Commerce Research and Applications* (2009).

76. Sundararajan, A., *Network effects.* <http://oz.stern.nyu.edu/io/network.html>.

77. Surowiecki, J., *Del.icio.us: how tags exploit the self-interest of individuals to organize the web for everyone.* <http://www.technologyreview.com/tr35/Profile.aspx?Cand=T&TRID=432>.

78. Swann, G. M., 'The functional form of network effects.', *Information Economics and Policy* 14, 417–429 (2002).

79. *TechCrunch.* <http://techcrunch.com/>.

80. *Technorati: What's Percolating in Blogs Now.* <http://technorati.com/>.

81. *The LogiLogi foundation - software libre for your web of free deliberation.* <http://foundation.logilogi.org/>.

82. *The web credibility project: guidelines - Stanford University.* <http://credibility.stanford.edu/guidelines/index.html>.

83. Udell, J., *Critical mass and social network fatigue.* <http://blog.jonudell.net/2007/02/06/critical-mass-and-social-network-fatigue/>.

84. *Update on Google Wave - official Google blog.* <http://googleblog.blogspot.com/2010/08/update-on-google-wave.html>.

85. Wagner, C., Liu, L., Schneider, C., Prasarnphanich, P., & Chen, H., 'Creating a successful professional virtual community: a sustainable digital ecosystem for idea sharing.', *Digital Ecosystems and Technologies* 3, 163–167 (2009).

86. Wagner, C., & Prasarnphanich, P., 'Innovating collaborative content creation: the role of altruism and wiki technology.', *Proceedings of the 40th Annual Hawaii International Conference on System Sciences* 18 (2007).

87. *Welcome to LogiLogi - YouTube.* <http://www.youtube.com/watch?v=n2-3xu1Vuzk>.

88. Westland, J. C, 'Critical mass and willingness to pay for social networks.', *Electronic Commerce Research and Applications* 9, 6–19 (2010).

89. Wiersma, W., & Lezama, M., 'LogiLogi: combining openness and quality of content.', *FKFT 2008 Proceedings* (2008).

90. Wiersma, W., & Sarlo, B., 'LogiLogi: a webplatform for philosophers.', *Digital Humanities 2008 Book of Abstracts* 221–222 (2008).

91. Wiersma, W., 'LogiLogi: philosophy beyond the book.', (2009).

92. Wiersma, W., *Modeling utilitarianism: In what sense, if any, can utilitarianism be proved? - Controversial logi.* `<http://en. manta . logilogi . org / Utilitarianism / Proof / Modelling / Introduction = Wybo_ Wiersma_128>`.

93. Wiersma, W., *Why do academics tend to come up with overly complicated things? - Controversial logi.* `<http : // en . manta . logilogi . org / Software / Academic / Complexity = Wybo _ Wiersma _ 126>`.

94. Wiersma, W., & David, S., 'Two scholarly web-agoras: the logilogi and talia/philospace approaches.', *ECAP 2009 Abstract* (2009).

95. *Wikipedia.* `<http : / / www . wikipedia . org/>`.

96. Witt, U., 'Lock-in vs. critical masses industrial change under network externalities.', *International Journal of Industrial Organization* 15, 753–773 (1997).