



Data report

Scratchpad survey 2009

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Table of content

Introduction	2
1. Methods	2
2. Population and survey sample	4
3. Results	7
3.1. Profile respondents	7
3.2. Motivation to use Scratchpads	11
3.3. Uses of Scratchpads	12
Discussion and conclusion	24
Annex 1. Institutional affiliations Scratchpad users	27
Annex 2. “Community of one”	29
Annex 3. Publishing work in progress	30
Annex 4. How virtual research tools change collaborations	32
Annex 5. User wish list for Scratchpads	34
Annex 6. Interview questions	37
Annex 7. Figures and tables	40
References	42

Introduction

Within the taxonomic community much has been said on the need to liberate taxonomy imprisoned on obscure printed pages, and freeing it to take part in the information revolution (Godfray, 2002; Wheeler, 2008 in Roberts et al, 2008). Turning this desire into reality faces two major challenges, one technical and the other social.

In 2007 a group of scientists from the Natural History Museum in London (NHML) took up this challenge and developed, under the name “Scratchpads”, an online, collaborative data management and publication tool precisely tackling these issues.

In a nutshell, Scratchpads are an intuitive web application, enabling communities of taxonomists to build, share, manage and publish their data on the web. They are available as a hosted web site containing a suite of tools for taxonomists and are a mechanism to facilitate collaboration. The default Scratchpad template has the capacity to support bibliographies, image galleries, specimen records, documents, custom data sets and maps. Data are classified and aggregated around a taxonomy supplied by the user (Roberts et al. 2008; Smith et al., 2008). To get a Scratchpad one needs to fill in an online registration form asking for a minimum of personal details, such as: name; affiliation; country; subject of the site etc. The developers’ team then assigns a web address and the NHML hosts the web site.

Until recently technical, social needs and barriers of the Scratchpads were addressed at a one-to-one base, by using feedback collected in informal and often unstructured settings. Since the uptake of the Scratchpads is continuous expanding further improvement of the application is essential so to cater for new groups of users. For this reason a more structured user study was thought necessary.

In this context a user interview survey was carried out (September 2009). The survey aimed to clarify the following issues related to the Scratchpads:

- 1) Gaining insight into the “profile” of the users;
- 2) Understanding the use and the impact users work processe(s) and output;
- 3) Understanding the motivation of the users;
- 4) Understanding the barriers that users encounter when using the Scratchpads;
- 5) Evaluate if the survey methodology used was satisfactory

We wanted to test several ideas that we had developed when interacting with the other users of Scratchpads.

1. Methods

Series of semi-structured interviews with 46 current and past users of Scratchpads were carried out. We made a distinction between two types of users: i) those who took the initiative to apply for a site and filled out the online registration form, called “maintainers” and ii) those who were invited after a site was launched to participate in a Scratchpad community called “members”.

At the time there were 107 maintainers registered who “owned” 129 sites. For the survey only the group of maintainers group (population) was invited to participate in the survey¹.

¹ As for July 2009

This group of users was thought to be the most relevant to talk to in a first survey because they were the users who were triggered by a need, curiosity or something else - to sign up and were likely to be the most active user of the community. Moreover they could be reached relatively easy as they had provided us with their contact details on the Scratchpad registration form. To reach as many maintainers as possible an invitation for participation was sent by direct mailing. Additionally the survey was announced on the several websites (e.i. <http://www.e-taxonomy.eu/node/628/>) and in relevant community newsletters. Interviews were booked using an online calendar that was integrated with a Scratchpad, enabling users to quickly arrange a slot using a technical environment with which they were familiar was used to gather the survey sample.

Over a period of four weeks 46 maintainers were interviewed who collectively maintain 61 sites, 4 maintainers had abandoned their sites at the time of the interview. A possible bias in the sample of the users' institutional affiliation and the influence of the voluntary selection procedure might play a role in the results². The interviews were carried out a by a sociologist, in a face to face setting or by telephone. The Scratchpads were recently founded and therefore the survey presented in this report wants first of all to be an explorative exercise to outline broad user related themes.

In the interview a combination of open-ended and closed-ended questions was applied. Closed-ended questions were used to get verification of certain observations and beliefs that the developers had developed since Scratchpads were founded. The open-ended questions were used to investigate users' opinions and attitudes on issues we had no (not much) information on yet. Questions were refined trough test interviews with a small set of users back-to-back with a Scratchpad training session. The interviews had an average length of 37 minutes and were captured in an online data management system, full transcripts were recorded and kept as back-up.

Because Scratchpads are built, developed and used by members of the taxonomic community and in particular by staff from the NHML, the interviewer was recruited from outside the community to guarantee impartiality and objectivity of the data collection process. The interviews aimed to understand the impact, motivation, barriers of use, and the profile of the users. The interviews were structured around the following questions:

- 1) Who are the users and what is their general attitude towards new technologies in support of their scholarly communication and research activities – e.i. demonstrated by their adaptation to a diverse range of other virtual tools.
- 2) Why how and wherefore are Scratchpads used?
- 3) How, according to the Scratchpad users Scratchpads have an impact on: the way they communicate/collaborate with peers, the way they organize their data and/or, facilitate (accelerates) data publishing in the broadest sense.
- 4) What are (if any), according to Scratchpad users and Scratchpad leavers the incentives and the barriers for adoption of Scratchpads include a combination of sociological and technical factors.
- 5) Is a structured interview survey a useful methodology to get answers to these questions?

As regards to the terminology used in this report we will refer to the person who signed

² An open call for participation is likely to attract those directly affiliated to the development team or other motivated users also called "voluntary-bias".

up for a site as “maintainer”. The maintainer of a Scratchpad, if he/she wishes, can invite others to join and contribute to the site. The maintainer has the possibility to create a log in account for each “member” and can assign to each member different levels of access and rights to change or add content on the site. The result is that every community can set its own organizational structure and division of labour or brand its site without any involvement or reporting obligation to the development team. A number of Scratchpads are a “community of one” meaning they have no members and that only the maintainer contributes to the site. We use the term “developers” for the core group of developers at the NHML, but others have contributed as well. The developers are also users of Scratchpads. “Leavers” refers to Scratchpad maintainers who have abandoned their site at the time of the interview.

Before discussing the outcomes of the survey a short summary of the group of respondents is given in relation to the total population of Scratchpad maintainers.

2. Population and sample

In our study we dealt with, in statistical terms, a small population (N=107). For this reason it was relatively easy to invite the whole population of Scratchpad maintainers to participate in the study. In the end 43% of the population of the maintainers volunteered to participate in our interview survey. We listed users’ – for the purpose of this survey - most relevant characteristics, such as their number, the number of sites they maintain, their institutional affiliation, the country where they are based and the subjects of their sites (Fig. 1 and Fig. 2).

When maintainers fill out the Scratchpad online registration form they are asked to give their institutional affiliation³. In Annex 1 we compared the affiliations of the population with those from the interview sample. A figure to pay attention to is the number of maintainers based at the NHML. This is an interesting figure because the Scratchpad initiators are based at NHML. Within the total population of Scratchpad maintainers the NHML hosts the biggest group, 28 maintainers are based at the NHML (26% of the population), in the survey sample 19 maintainers are based at the NHML (41% of the sample).

In the population under study 107 maintainers manage 129 sites. The 46 interviewees in the sample manage 61 sites, of the 46 maintainers 4 had abandoned their sites and are not counted in the 61. The subject fields of the sites are plotted in Fig. 3 and Fig. 4.

³ After registration this information is not updated, therefore “institutional affiliation” tell us where the user was based the moment he/she filled out the online form.

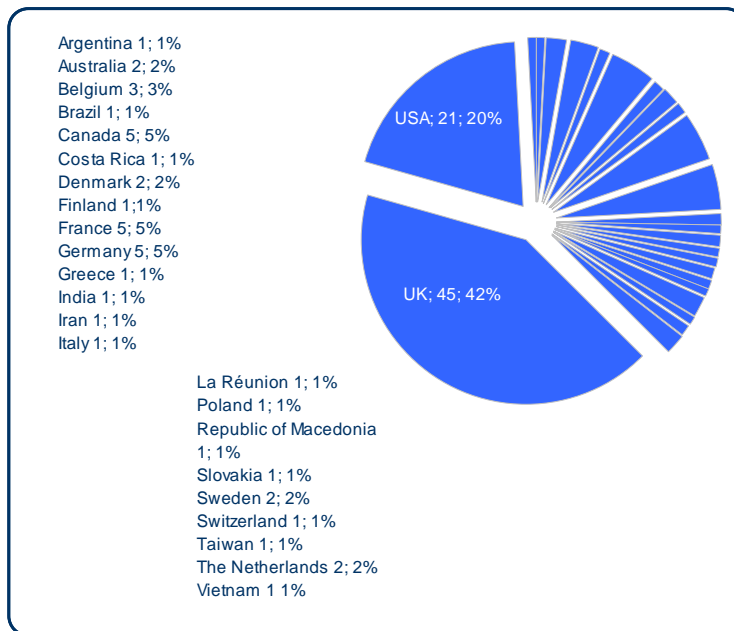


Figure 1. Partition of population of Scratchpad maintainers and their base country (total population 107, based in 25 countries)

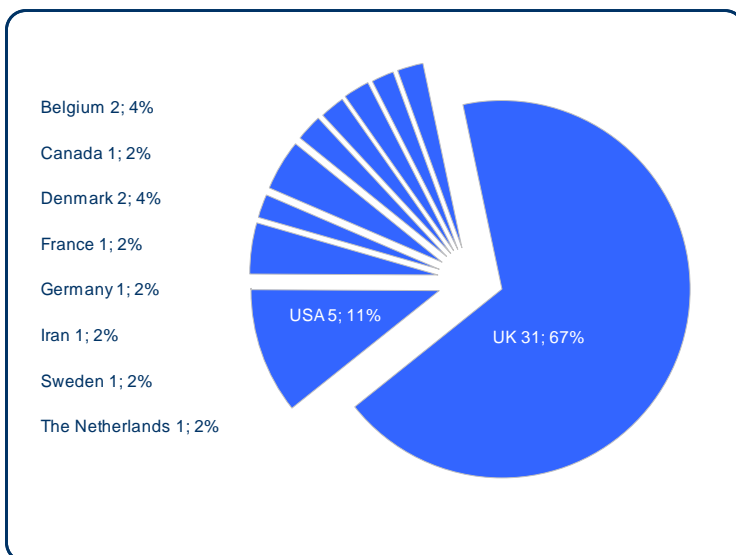


Figure 2. Partition of sample of Scratchpad maintainers and their base country (total number respondents 46, total number of countries 10).

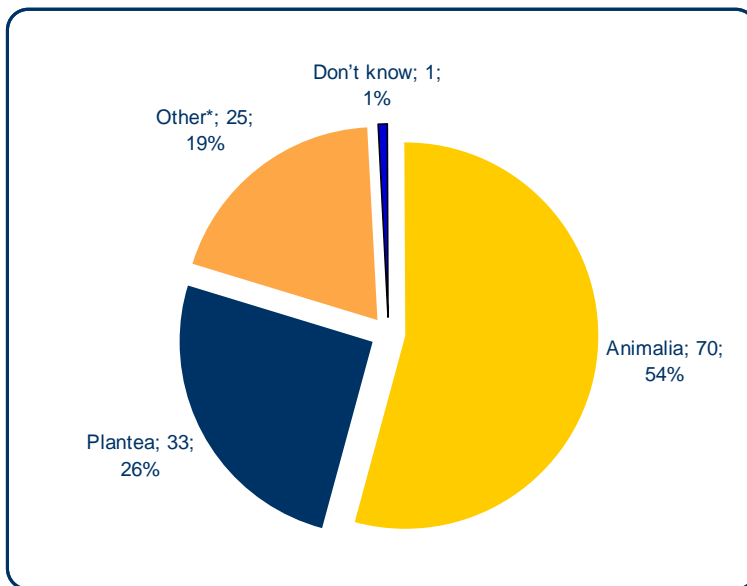


Figure 3. Partition of population of Scratchpad maintainers and the content of their sites (107 maintainers manage 129 sites).

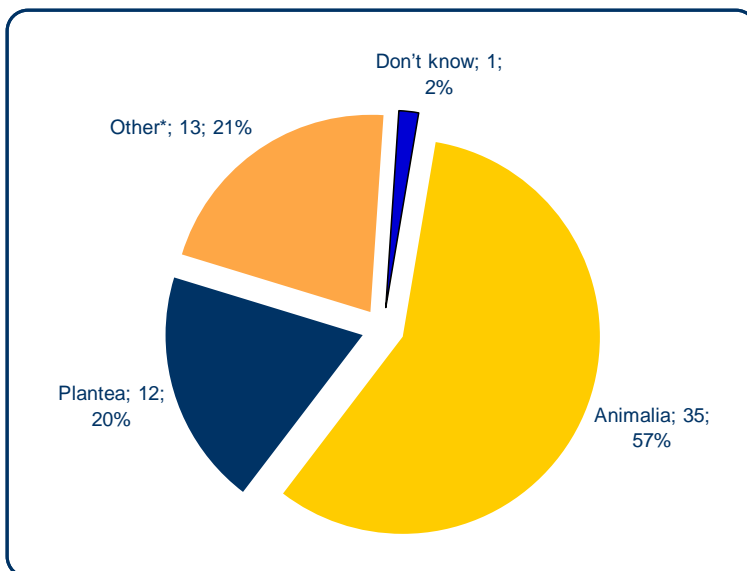


Figure 4. Partition of sample of Scratchpad maintainers and content of sites (46 respondents manage 61 sites).

"Other" refers to content such as: general biodiversity subjects; bioinformatics; science projects etc.

3. Results

In this section we present the outcomes of the interviews among Scratchpad maintainers. The graphs below are a visual illustration of the answers given by the interviewees. The graphs show actual numbers and percentages and mention if the question was an open-ended or closed-ended question (O,C), if one or multiple answers were requested (one, multi) and the number of respondents that answered the question (n). For an important part also the data of the open-ended questions is presented in a graph or table. Here the responses are grouped in categories made-up *after* the interview, based on the information set for a given question. Where we thought that the exact quotes of the respondents were important to discuss - a table with a summary of the answers from each respondents was given.

The interview had different questions for, for instance current users and those who had left their Scratchpads. Paths settings were built in the interview script and depending on answers given by interviewees, they were diverted to a slightly different set of questions. This explains why not every question was answered by the same number of respondents⁴. The percentages in the graphs refer to the total number of interviewees who answered the question.

Below we present the results on the user profile of the interviewees, what motivates them to sign up, wherefore they use their Scratchpads. Then we present the results on barriers and incentives that they encounter while using their sites and we conclude with the outcomes on the satisfaction of users with the Scratchpad “help services” and their suggestions for further improvement of the web application.

3.1. Profile interviewees

Above we presented where the interviewees are based and the content they work with their Scratchpads. Subsequently we also collected “interviewees profile” information, such as age, ways of working off-line, how interviewees communicate their research, how often they use other virtual research tools (Table 1. Fig 5-12).

Table 1. Age groups respondents*

Age	Number	%
under 25	2	4%
25-34	7	15%
35-54	26	57%
55-65	7	15%
Over 65	3	7%
No information	1	2%

*[n=46, C/one]

⁴ If a question was skipped by a respondents, although according to the answer the question this is indicted at the footnote with *. Reasons for s time due to a bug in the interview script.

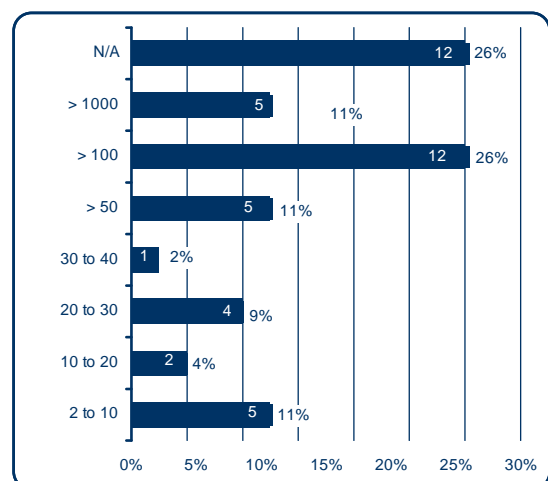


Figure 5. Users and their estimation of the number of their colleagues working on the same taxonomic group (or subject). N/A refers to users who at the time of the interview did not work on taxonomic groups. [n=46, O /one]

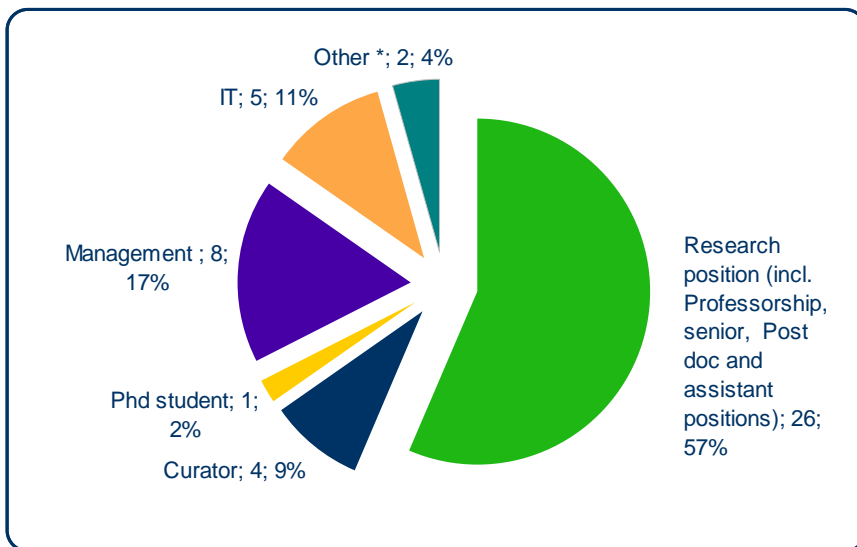


Figure 6 Job position Scratchpad users [n=46, C /one]

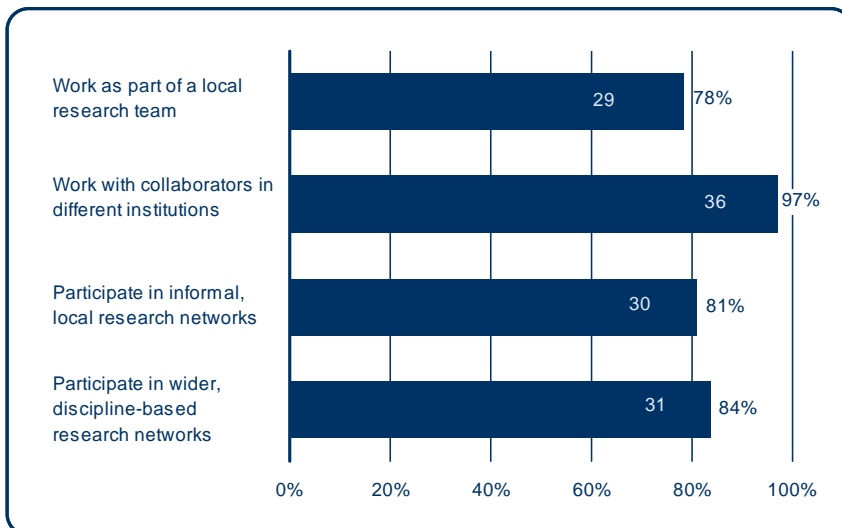


Figure 7. Number of users and how they do research off-line [n=37*, C/multi]

*9 people didn't answer questions

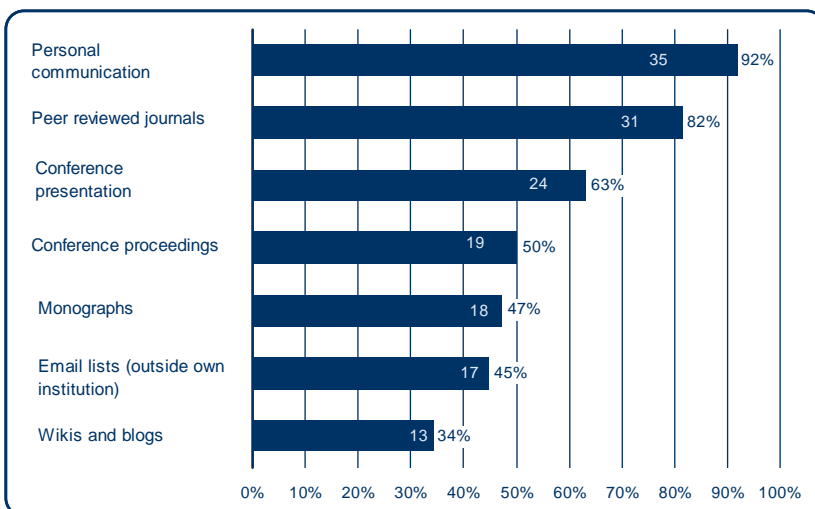


Figure 8. Number of users and the most important way(s) they communicate research [n=38, C/multi]

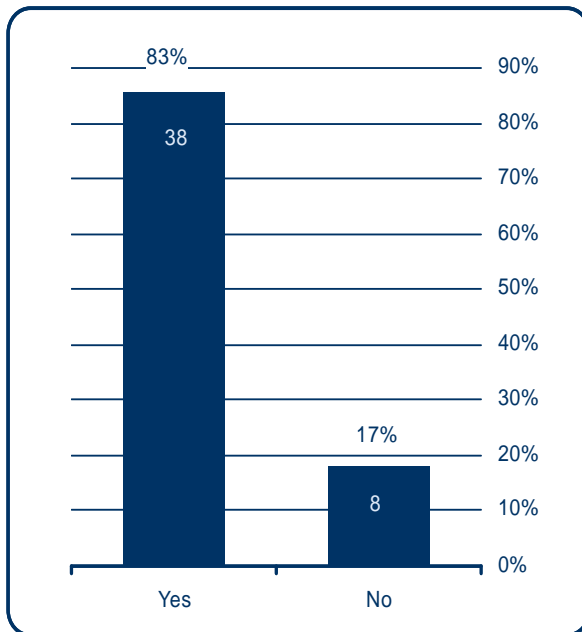


Figure 9. Number of users and usage of virtual research tools other than Scratchpads (e.g. blogs, forums, other web based software (email excl.) [n=46, C/one]

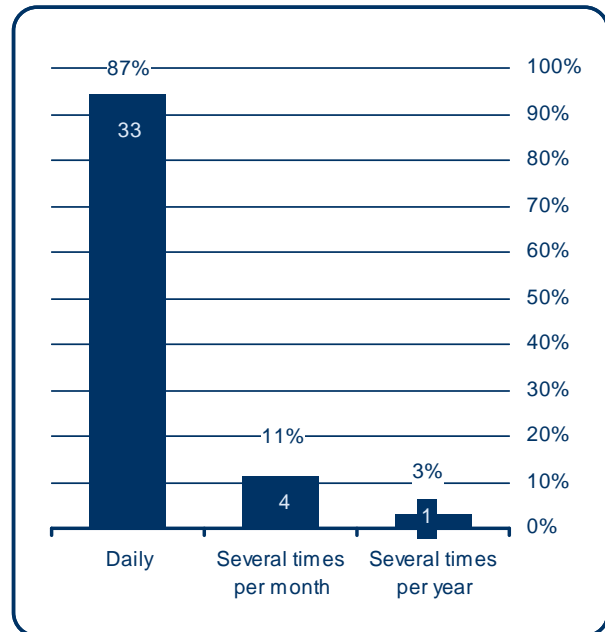


Figure 10. Number of users and number of times they use virtual research tools, other than Scratchpads (see also Table 2) [n=38, O /one]

Table 2. Usage of virtual research tools other than Scratchpads. Tools that were mentioned more than once [n=38, O /multi]

Virtual research tool(s) >1	
Online Journal sites (Zootaxa, JSTOR, Pubmed, BHL, Biosis, NHM library catalogue)	37
Forums TDWG, Mosquito, Zoobank groupage, Diptera	10
Google docs	7
Databases (GemBank, Marine Species Register, Tropicos, Collection databases, Delta databases)	7
Blogs	6
Google/Google scholar	5
Virtual Herbariums	4
Skype	4
Wikis	3
Wikipedia	3
Web of Science	3
Zotero	2
ipni.org	2
Geo-referencing tools	2

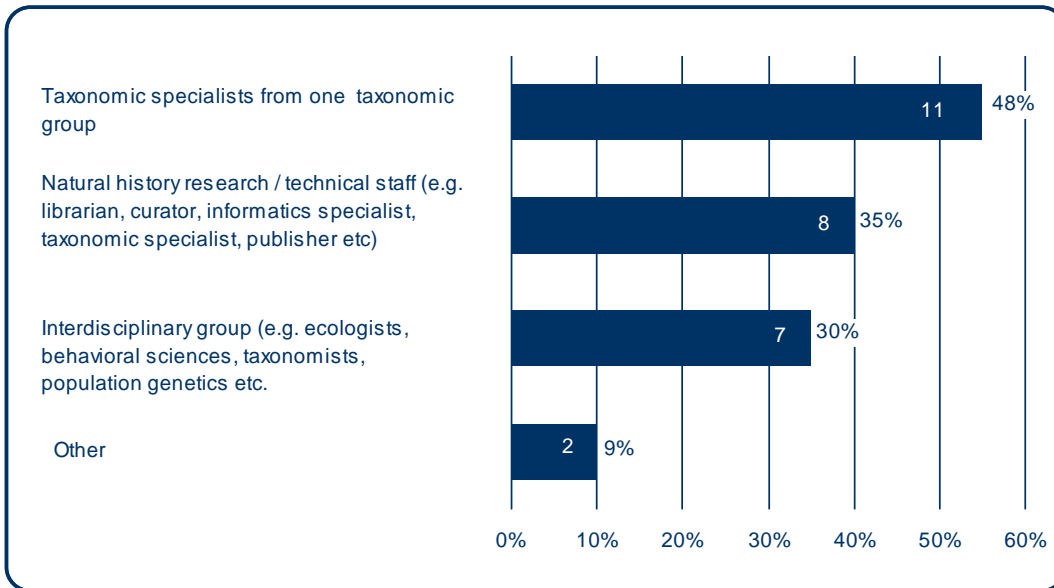


Figure 11. Number of users and sub groups of virtual collaborators while using virtual research tools other than Scratchpads (under "other" were mentioned IT developers exchanges) [n=23*, O /multi]

*9 respondents didn't answer the question

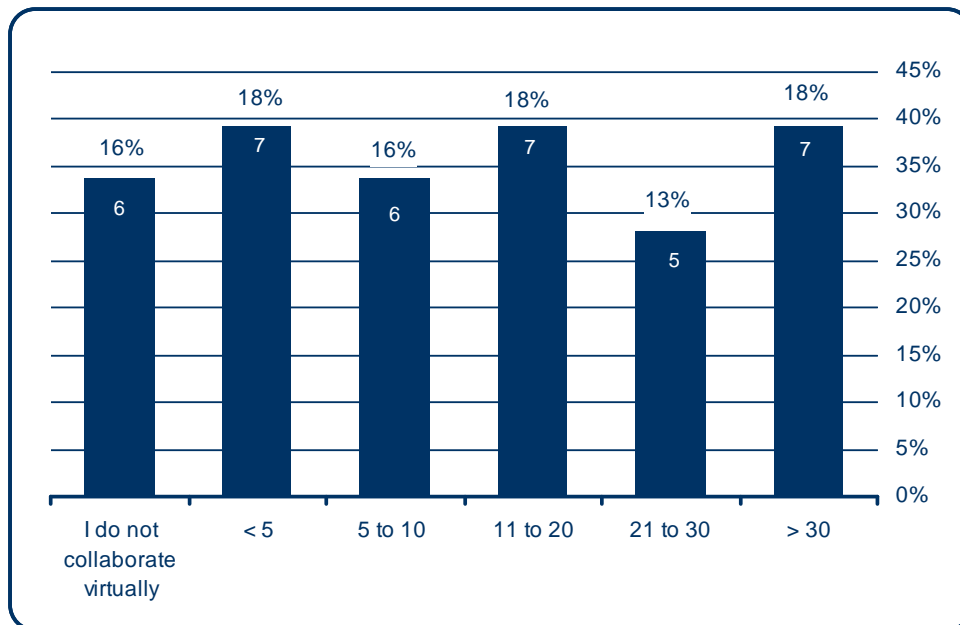


Figure 12. Number of users and approximate number of people they interact with while using virtual research tools mentioned in Table 2 [n=38, O /one]

3.2. Motivation to use Scratchpads

A wide spread stereotype of a taxonomist is a conservative scholar who is happy to stick to traditional research methods that were in use for the last 150 years or so and who is not easily motivated to change its work practices or data management (Godfray et al, 2004). If the stereotype were true Scratchpads represent a revolutionary change in doing taxonomy and are very likely to have a significant impact on data management, publishing and collaboration in the field.

In our study we asked our interviewees why they signed up for a Scratchpad and if their expectations were met. In this paragraph we list the results related to this motivation.

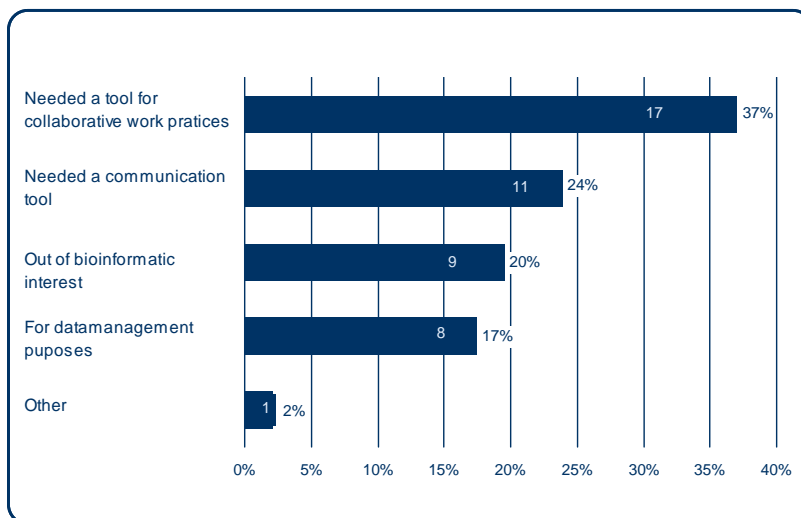


Figure 13. Number of users and why they register for a Scratchpad site [n=46, O /one]

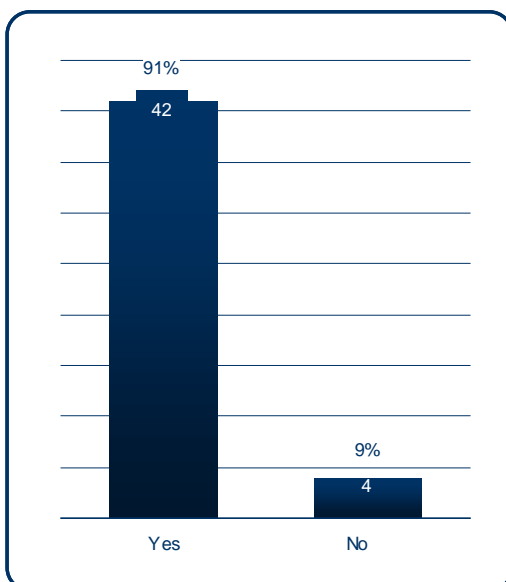


Figure 14. Number of users that plan to continue to use Scratchpads in the future [n=46, C /one].

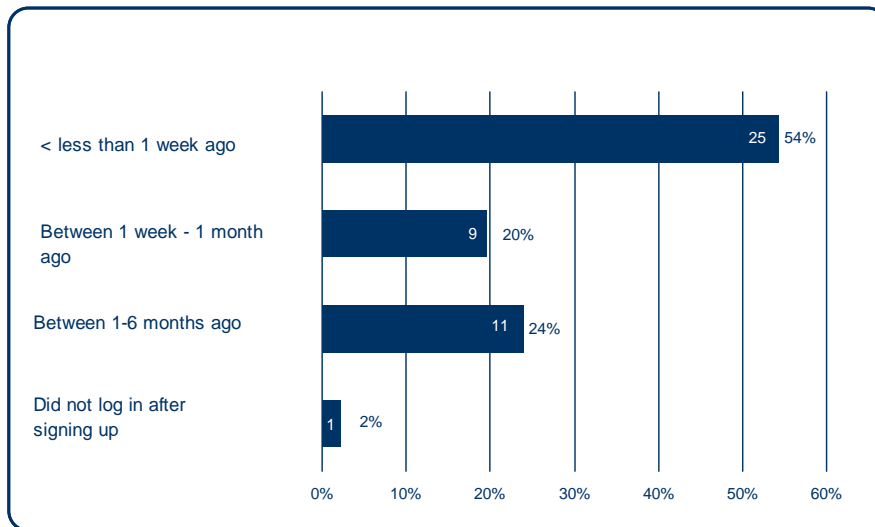


Figure 15. Number of users and last time users logged on their Scratchpad site [n=46, O /one]

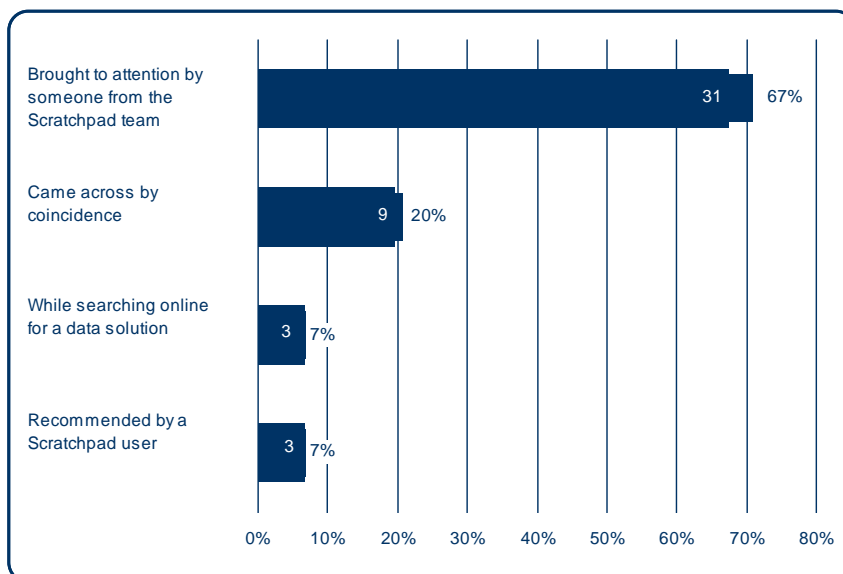


Figure 16. Number of users and how they heard about out Scratchpads [n=46, O /multi].

3.3. Uses of Scratchpads

In our survey we investigated how and wherefore Scratchpads are used by the interviewees. Scratchpads are developed by scientists from the NHML who are themselves Scratchpad users. At start, the design priorities were based on the developers' personal ideas and needs wherefore Scratchpads should provide an answer. There was only a vague idea wherefore other taxonomists could be interested to make use of them. In anticipation to this

knowledge gap the application was developed to be intuitive and as open as possible for others to utilize it for their own purposes. For instance users are free to choose from: i) to use their Scratchpads as a social medium, where the maintainer invites others to become a member and work collaboratively on the site; ii) either to use it as a “community of one” for the dissemination research information. When using the collaborative feature users can choose to share “work in progress” (in contrast to published/signed off work) or to keep it in a private section. We were particularly interested to know what users’ views are on this subject in light of the Open Science, Open Access and Creative Commons movements which are at the base of the Scratchpads.

During the interviews respondents were asked wherefore and how they use Scratchpads, if they work alone or collectively and if so how they organised their collaboration. Additionally we were interested to know more about the impact of Scratchpads on the work of the interviewees. This is discussed in a separate paragraph 3.3.1.

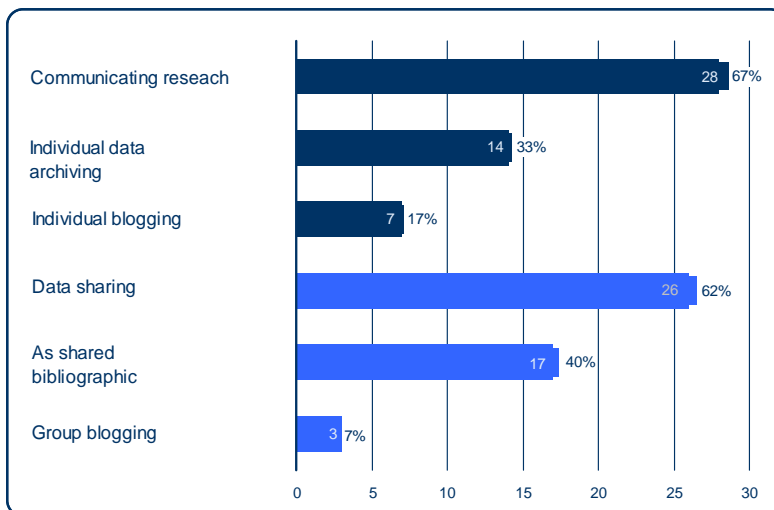


Figure 17a. Number of users and different uses of Scratchpads. Distinct categories for individual and group activities [n=42, O /multi]

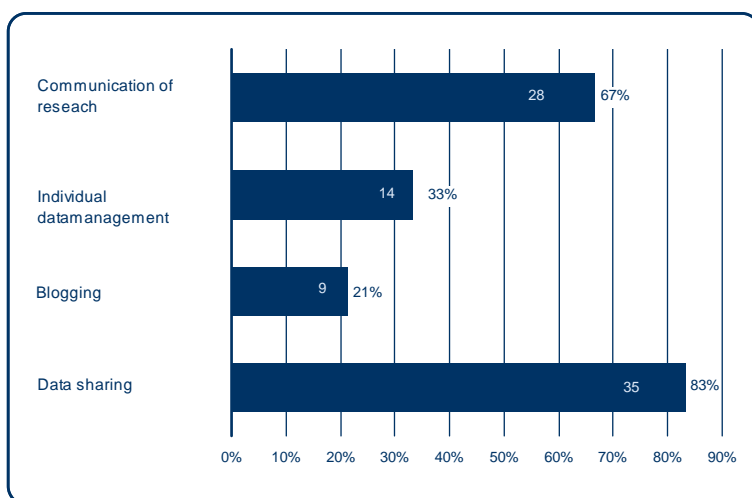


Figure 17b. Uses of Scratchpads. “Individual blogging” and “group blogging” and “Data sharing” and “Shared bibliographies” (Fig. 17a) are merged [n=42, O /multi]

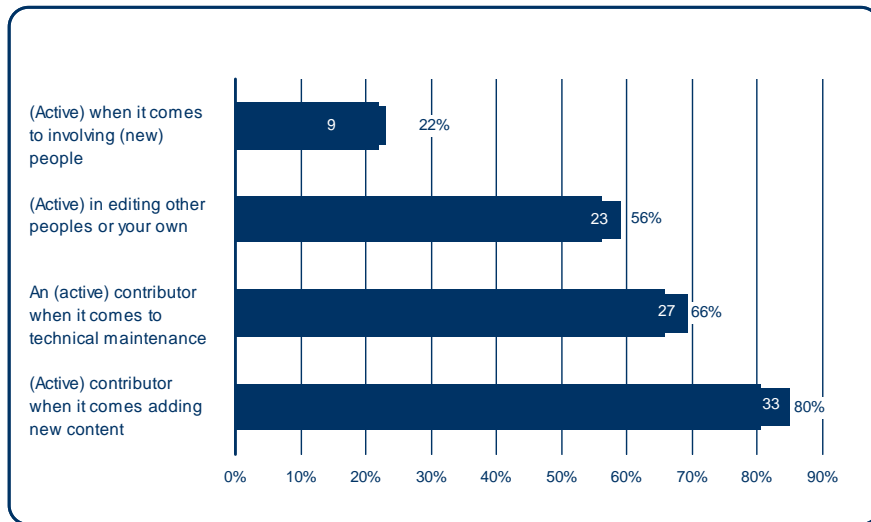


Figure A. Number of users and how they describe the contributions to their sites [n=41*, O /multi]

*one respondent didn't answer the question

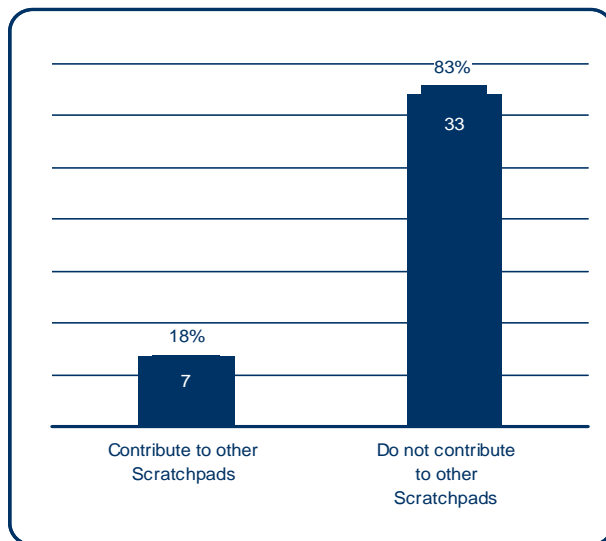


Figure B. Number users and their contribution to other Scratchpads [n=40, C /one]

*2 respondents didn't answer the question

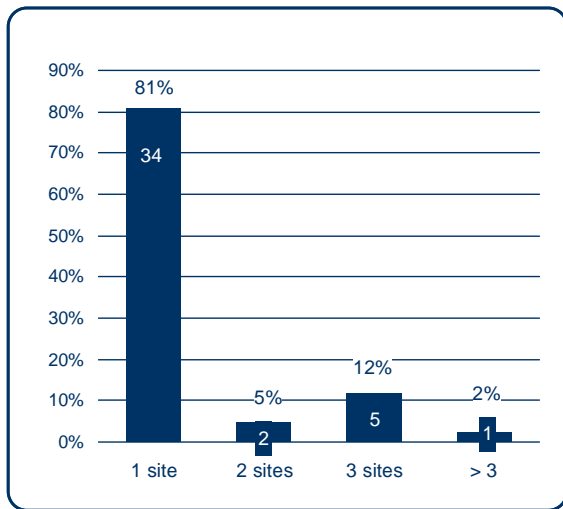


Figure 18. Number of users and number of sites they manage [n=42, O /one]

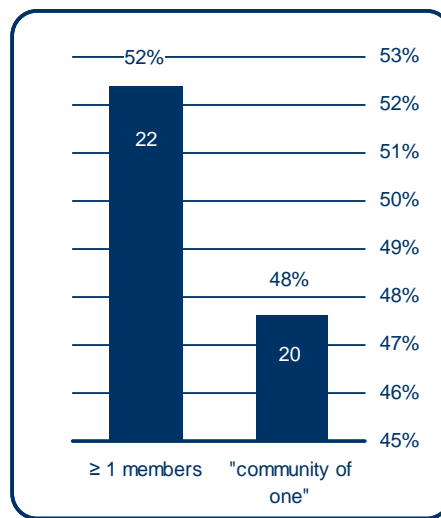


Figure 19. Number of users that have at least one site with ≥ 1 "members" and number of users who manage instead one or more sites that are a "community of one" [n=42, C /one]

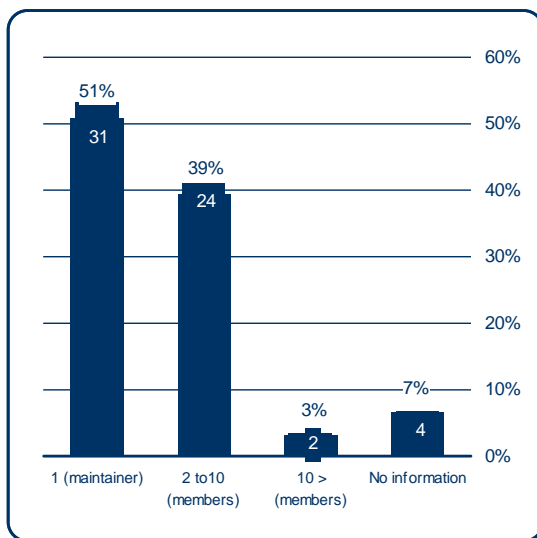


Figure 20. Number of sites and number of active members per site. For 4 sites no information was given. Total number of sites 61. [n=42, O /one]

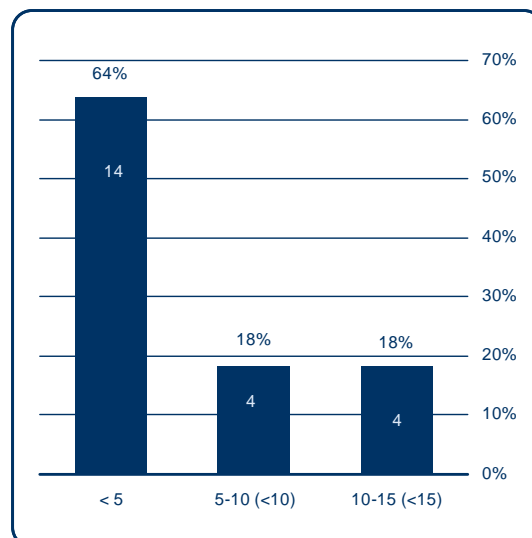


Figure 21. Number of users and number of community members they were acquainted with before they started collaborating on their Scratchpad site [n=22, C /one].

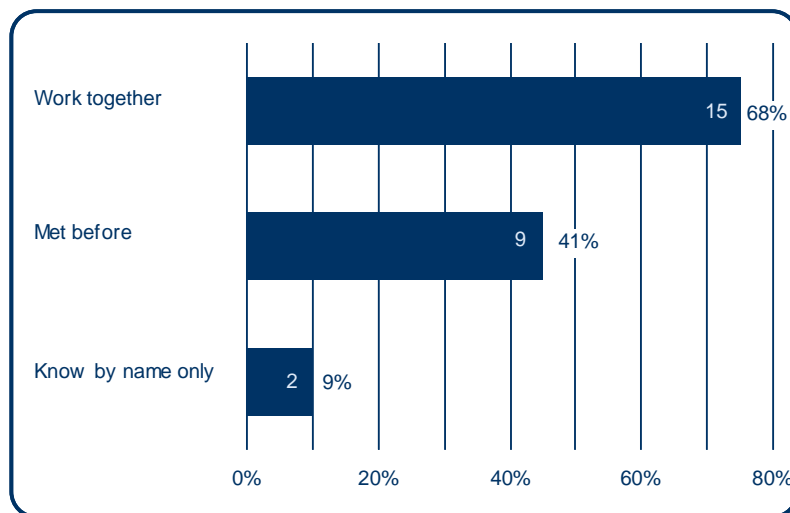


Figure 22. Number of users and level of acquaintanceship between maintainer and members [n=22, C /multi]

Table 3. Users' main reasons why Scratchpads are a "community of one" (See Annex for complete list of responses [n=14, O /one])

Concern 1

Loss of control over quality

Concern 2

Early stage of the development of the site, several respondents thought it was too early to invite others to join in.

Concern 3

Characteristics related to the target audience. The community was thought to be too small to get involvement either they lacked the expert background needed

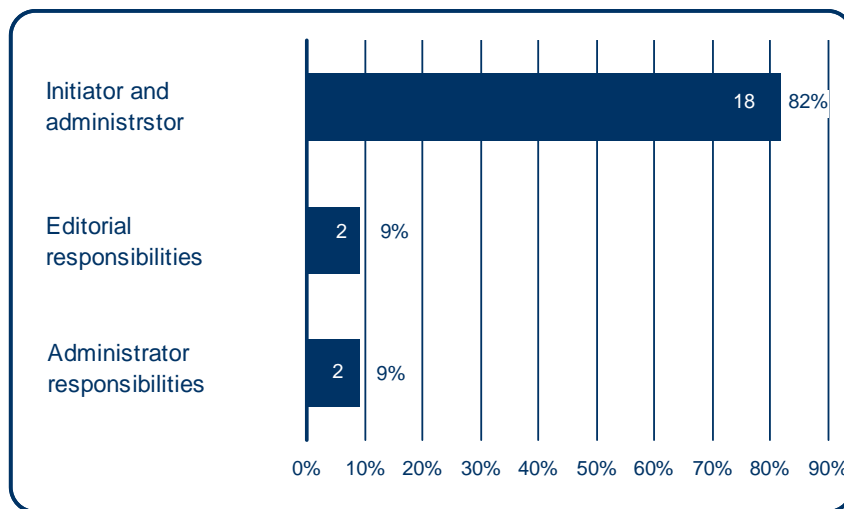


Figure 23. Number of users and their responsibilities in Scratchpad community [n=22, O /one]

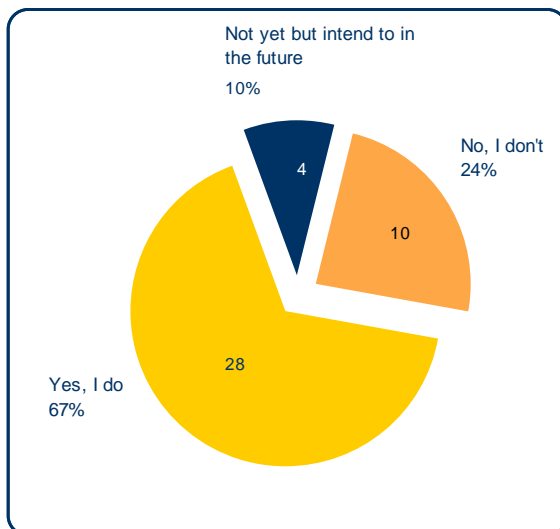


Figure 24. Number of users that "publish work in progress" (privately or publicly) [n=42, C/one]

3.3.1 Impact of use

As part of our enquiry how and wherefore the respondents use Scratchpads we wanted to know if they observe that their sites have an impact, for instance on the way they work. We asked specifically how this showed and if the interviewees were satisfied with the impact/change.

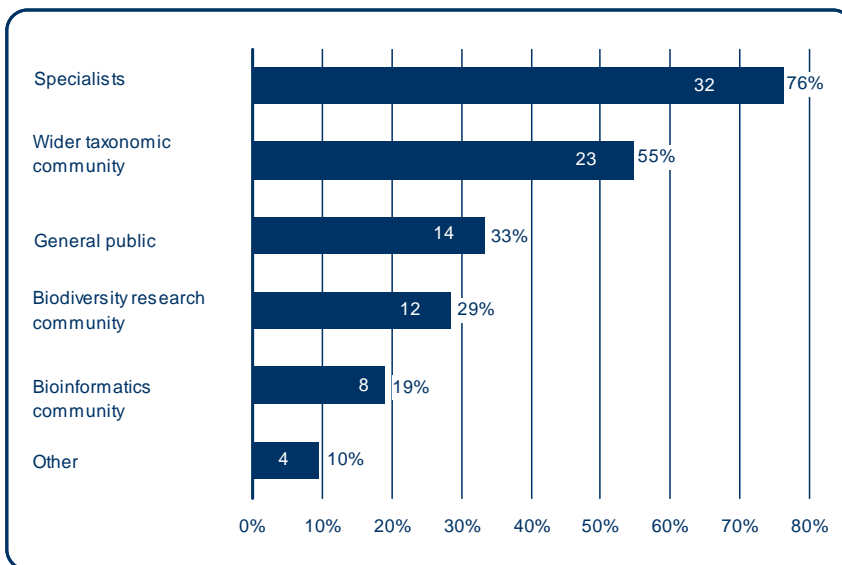


Figure 25. Number of users and different target audience of the sites. [n=42, O /multi]

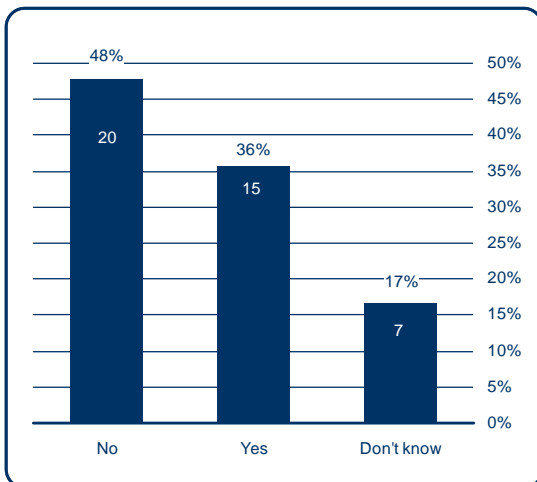


Figure 26. Number of users and achieving goals set for Scratchpads. If more than one site the reference is to the collective of sites [n=42, C /one]

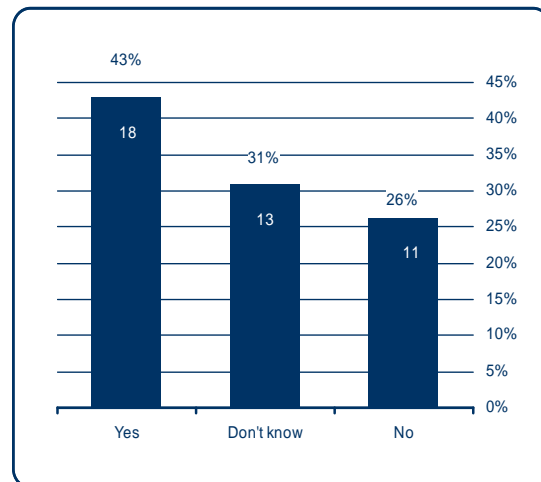


Figure 27. Number of users and their satisfaction with impact of their site(s). Users with more than one site referred to the collective of their sites [n=42, C /one].

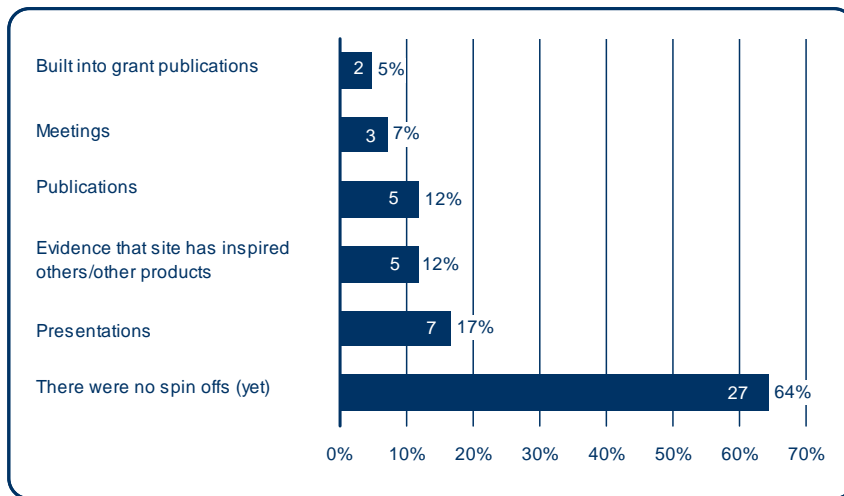


Figure 28 Number of users and Scratchpad spin-offs. Reference is to the collective of the sites of each respondent. [n=42, O /one]

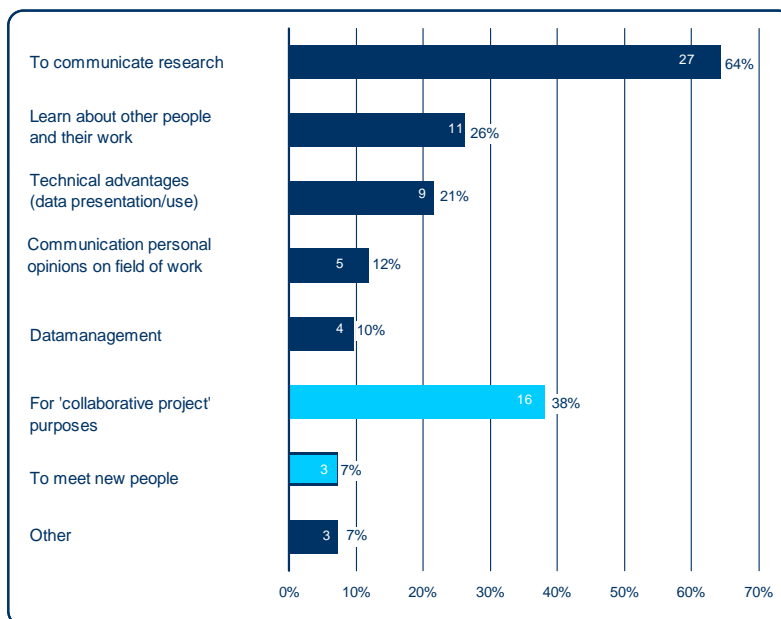


Figure 29. Number of users and what they see as the main benefits of the Scratchpads [n=42, O /multi]

One of the questions asked in relation to the impact of the Scratchpads and the use of other virtual research tools was “if the tools used had changed the way respondents worked with others”. Respondents were asked to compare this with the way they worked before the rise of these tools and to give their opinion of this change.

The main conclusion that can be drawn from the response is that the respondents observed a “slight change” to collaboration as being “completely different”. Most important changes mentioned were: improvements in communication efficiency; scaling and possibility to participate in complex communication processes with many people and different document formats. One of the young respondents stressed not been in field before the rise of the internet (a summary of each answer given is listed in Annex 4).

3.4. Barriers and incentives of use

In the interview we asked about possible incentives and barriers in the interviewees work environment that either facilitate, motivate or hinder the use of Scratchpads (we devoted a separate section below on the “Scratchpad help facilities”). The questions asked are presented in Fig. 30-32 and Table 4.

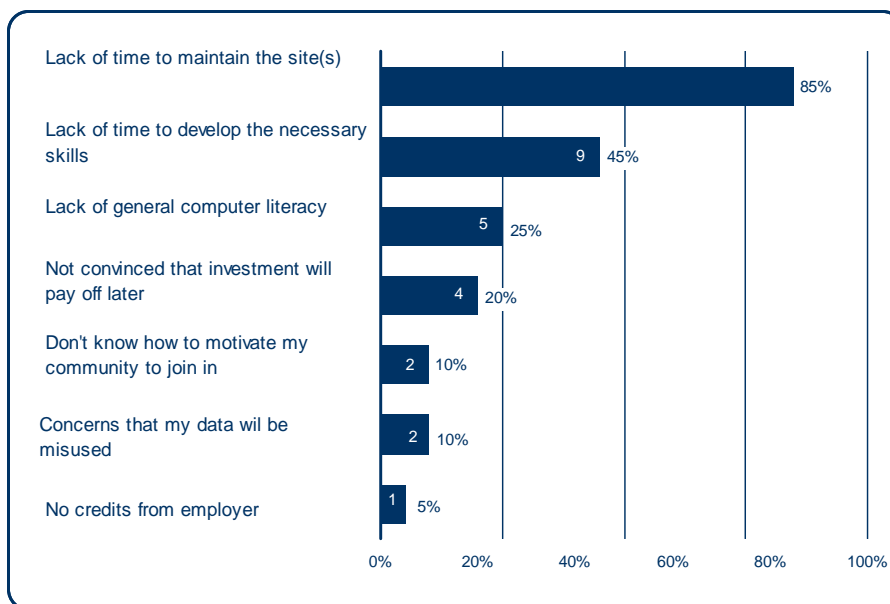


Figure 30. Number of users and most important barriers to achieve goals set. Under “other” were mentioned several technical [n=20, O /multi]

Table 4. Barriers encountered that turned users away from Scratchpads (respondents that mentioned "no" under Fig. 14) [n=4, C /one]

Respondent	Barriers encountered that turned users away
5	Extremely difficult to use. Couldn't work out where to begin. Wasn't intuitive at all. Expectations - template to fill - was not the case. How to populate a page was not obvious.
7	Think it's a great tool, just can't see using it for the time being. Problems: Slow, buggy, sometimes unavailable and remote storage of content. Slow - turnaround time for editing is slow. Buggy - e.g. javascript errors. Server has been down from time to time. Remote storage of content - slow to access (over in the USA) and publicly available. Rather just write the site in HTML.
8	The basic need changed for the respondent. Another way was initiated for respondent's sign up list. Scratchpads were time consuming for learning the ropes of the system - kept putting the Scratchpad project off.
13	Nothing turned out against expectations. Two barriers: 1- the complexity 2-programming time that's available to work on SP.

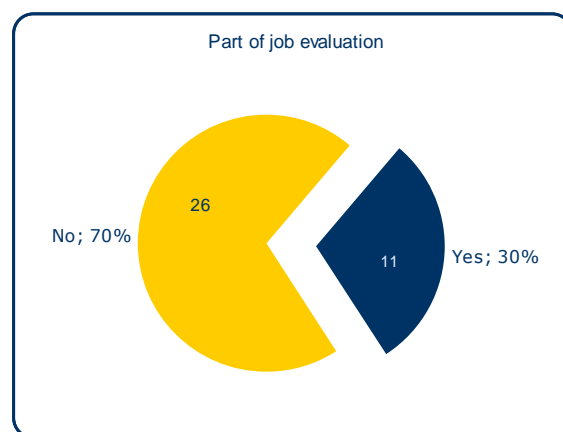
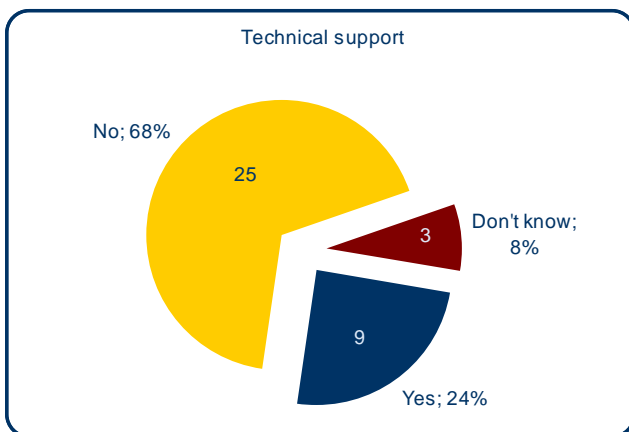


Figure 31 and 32. Number of users and institutional incentives to use virtual research tools [n=37*, C /multi]

* 1 respondent didn't answer

We asked the respondents for their technical design "wish list" stating how they thought the Scratchpads could be improved. They came up with many different wishes. The following wishes were mentioned several times (for full "wish list" see Annex 5):

- ❖ Improvement the usability, needs to be more intuitive
- ❖ Need for better facilitation for managing different security levels for different members and different pages of the site.
- ❖ Better dealing with taxonomy ("doesn't deal with taxonomy properly")

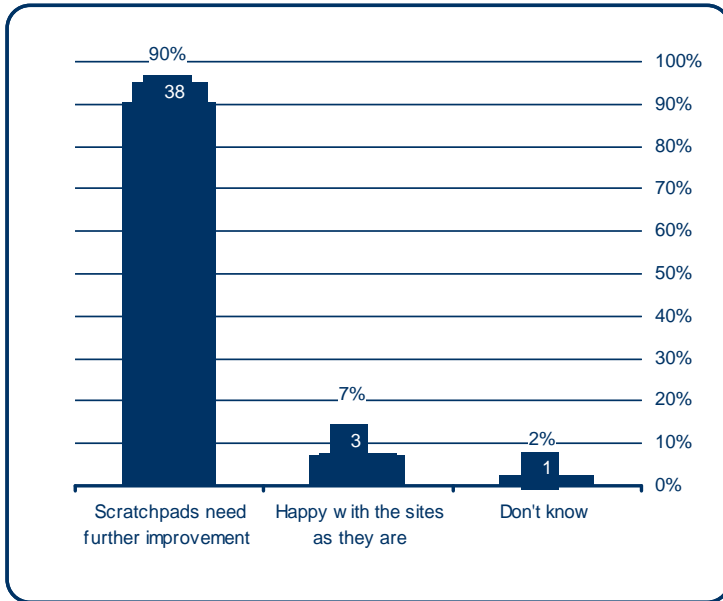


Figure 33. Number of users and their view on Scratchpads development stage, [n=42, C /one]

3.4.1 User satisfaction with technical support

We distinguished incentives as formulated and observed by the respondents (disused above) and the incentives (lowering barriers) as build in by the developer's team and presented in this paragraph.

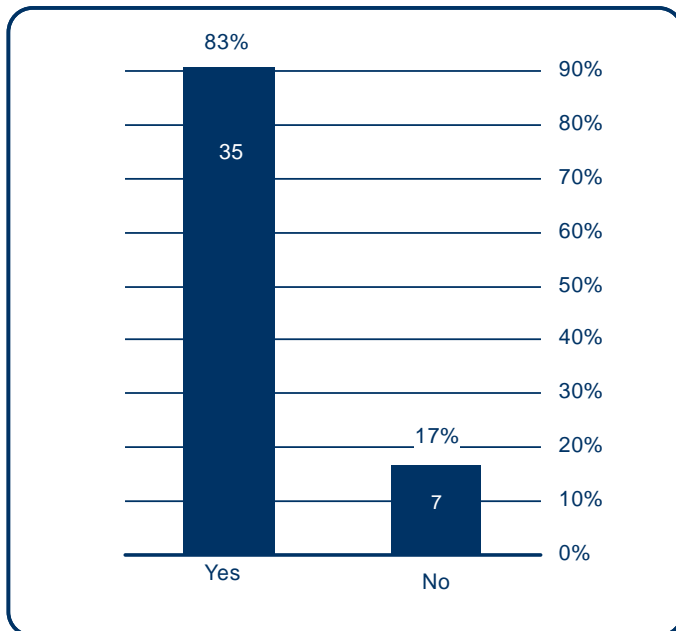


Figure 34. Number of users who said to have used the help and feedback options (e.g. the Scratchpad forum, the blog, viewed any of the help videos), or had direct contact with the developers [n=42, C /one]

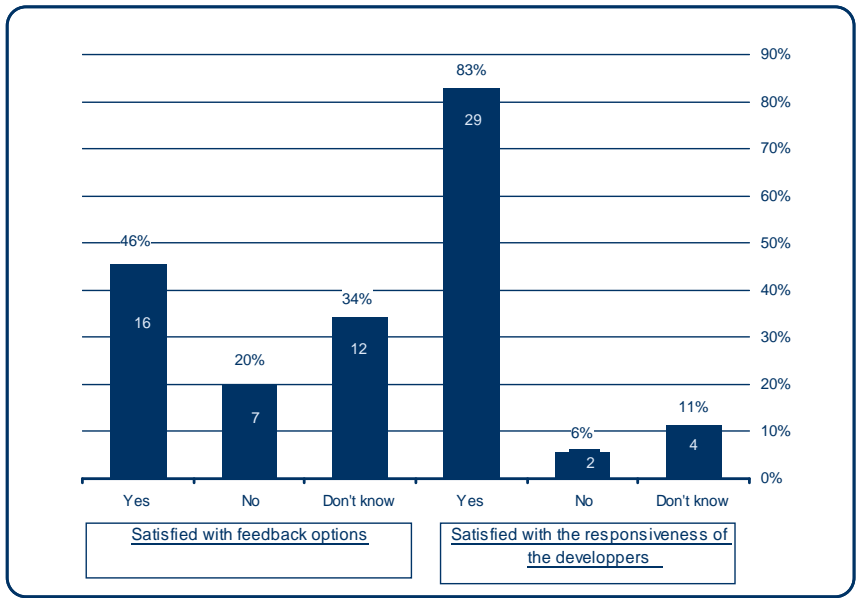


Figure 35. Number of users and their satisfaction with Scratchpad” help” facilities and services [n=35, C /multi]

Discussion and conclusion

In the context of rapid expansion of the new web application for taxonomists, Scratchpads, we interviewed 46 users in order to understand who they are, what motivates them to sign up for a site, wherefore they use them, how they see Scratchpads have an impact on their work, what barriers and incentives they encounter while using and to know their level of satisfaction with the technical support. We were able to interview 43% of the total population of Scratchpad maintainers⁵.

As explained this user survey wants in the first place to be an explorative study to identify the most important themes related to the use of Scratchpads. In this section we summarise how the results presented in the report helped us to acquire a better understanding on the following 5 subjects:

- ❖ *Who are the users and what is their general attitude towards new technologies in support of their scholarly communication and research activities – e.i. demonstrated by their adaptation to a diverse range of other virtual tools.*

The results discussed in paragraph 3.1 demonstrate that the interviewees:

- are not strikingly young nor aged, 57% falls in the category 35-54 year. (However note we are dealing with a general high number of ageing taxonomists world wide⁶).
- frequently use virtual research tools (other than Scratchpads), e.g. 87% says they use them on a daily basis.
- use mainly traditional scientific communication means such as personal communication, peer reviewed journals, conference presentations etc., but also stated to use email lists (outside institution) and 34 % mentioned wikis and blogs are an important way to communicate their research.
- collaborate virtually with colleagues from the same specialisation but say they also work online with technical staff and with colleagues from other disciplines (see Fig. 11).
- describe themselves as active collaborators (offline and online) at different organisational levels, in local and global networks and in formal and informal settings (Fig. 9)
- are in the direct circle of the Scratchpad development team, 67% learnt about Scratchpads because it was brought to their attention by one of the developers (Fig. 16)

- ❖ *Why, how and wherefore are Scratchpads used?*

The results in paragraph 3.3 demonstrate that (some of) the interviewees:

- have different level of use intensity of the Scratchpads. Last time interviewees logged lays between 6 months and less than 1 week counting from the day of the interview.
- majority owns one site (Fig. 18) (81% versus 2% who owns more than 3 sites)

⁵ As for July 2009

⁶ See also a paragraph on the age profile of taxonomists in the United Kingdom in a report from the House of Lords (July, 2008).

- differ in the level of community participation at their Scratchpad, e.g. of the 61 sites 51% is a “community of one” (Fig. 20).
 - 63% of the interviewees who have a community web site stated that their Scratchpad community members were people they already worked with versus 35% who stated they only met occasionally before collaborating on their Scratchpad (Fig. 22).
 - who created an community site - also after inviting others to join- continue to carry out the administrator responsibilities of the site (80%, see Fig. 23).
 - with or without web communities - use, among others, the Scratchpad for one-way communication (“communicating research”) and two way communication activities (“data sharing”) (see also motivation in paragraph 3.2).
 - use their Scratchpads to publish work in progress (Open Science) but that some prefer to do so only with a small group of selected peers (see Fig. 24 and Table 7.)
- ❖ *How, according to the Scratchpad users Scratchpads have an impact on: the way they communicate/collaborate with peers, the way they organize their data and/or, facilitates (accelerates) data publishing in the broadest sense.*

The figures in paragraph 3.31 demonstrate that (some of) the interviewees:

- have different levels of satisfaction concerning achievement of the goals they had for their Scratchpads, e.g. 48% said their site did not achieve the goals set 36% said they did and 17% did not know if the goals were achieved or not (Fig. 26).
 - name the main benefits of the Scratchpads among others as the straightforwardness to communicate their research and to distance work with others (Fig. 29) This corresponds with the reasons mentioned on why they signed up in the first place (Fig. 16).
 - mentioned many different ways how Scratchpads and other virtual research tools have changed how they collaborate (Table 8, Annex 4)
 - observe some but not many spin-offs coming from their Scratchpads yet. 64% said they see no-spin-offs, 29% said Scratchpads set off information for presentations and general inspiration for their work were named as most important spin offs (Fig. 28).
- ❖ *What are (if any), according to Scratchpad users and Scratchpad leavers the incentives and the barriers for adoption of Scratchpads?*

The results in paragraph 3.4 demonstrate that (some of) the interviewees:

- blame the lack of time to be the main reason while their site(s) fail to achieve the goals set (82%)
- signed up for a Scratchpad because they are motivated to use tools for collaboration (two-way direction), to communicate (one way direction), out of bioinformatics interest, for data management purposes.
- who abandoned their Scratchpads (called leavers), were mainly motivated to do so by technical hindrances (Table 4).

From Fig. 31 and Fig. 32 we can indirectly deduce other possible barriers for adaptation of Scratchpads because here interviewees mentioned:

- that they receive little technical, institutional support to use virtual research tools nor receive credits from their institutions to do so .
- mention there is no technical support in their institution to work with virtual research tools (68%)
- state that use of virtual research tools is no part in their job evaluation (70%)
- 90% would like to see the Scratchpad are further improved (Annex 5, Table 9) and implementation of technical wishes such as: improvement the usability; need for better facilitation of managing different security levels for different members and different pages of the site; better dealing with taxonomy (“doesn't deal with taxonomy properly”)

Barriers to use are lowered by general satisfaction of the Scratchpad help support

- 46% of the interviewees are satisfied with the feedback option
- 83% is satisfied with the responsiveness of the developers

❖ *Is a structured interview survey a useful methodology to get answers to these questions?*

The interviews generated rich data about the profile of the users and on how and wherefore they use Scratchpads. We learned about the organisation of communities and goals set, the spin-offs of sites, technical barriers and wish list, information that is extremely useful for the further development of the application.

From informal communication with users (for example during meetings and training sessions) we know that social barriers such as “trust” and “recognition” are a concern for a number of users. However only some interviewees mentioned these. When asked about barriers interviewees easily listed technical problems and quickly draw a technical wish list for their site(s). They clearly felt comfortable talking about technicalities. The results are less persuasive when it comes to social barriers. Either the importance of these type of barriers was not prevalent in our sample either a structured (phone) interview was not the best method to investigate this type of barrier. Further study is needed.

A characteristic of the type of interview used is that the method is labour intensive in terms of preparation of the interview, recruitment of a trained interviewer and the carry out and analyse the open-ended questions. Furthermore the success of the survey depends strongly on the motivation of Scratchpad users to participate in an interview. For them there is no direct interest, only on the long term, when their feedback is used in the future development of the sites. In short an application like the Scratchpads, with a continuous changing and expanding population, might profit from a more flexible, “lighter” user study methodology.

Ideally a user study draws on an approach that is interesting (or fun) for survey participants and generates quick results that can be translated into the development and organisation of the Scratchpads. Further exploration of possibilities to build in user feedback during training sessions, to create participatory experiments, or content analysis of sites (cloud tags, web/users analytics) - needs to be studied.

Annex 1. Institutional affiliations Scratchpad users

Table 5. Institutional affiliations in population of Scratchpad maintainers* versus the group of interviewees

Institution	Population		Respondents	
Agriculture and Agrifood Canada - Canadian National Insect Collection	1	1%	1	2%
American Museum of Natural History	4	4%		0%
Arizona State University - International Institute for Species Exploration	1	1%		0%
Comenius University, Bratislava	1	1%		0%
Conservatoire Régional des Espaces Naturels Rhône-Alpes (CRENRA)	1	1%		0%
Dept. of Biological Sciences, National San Yat-Sen University	1	1%		0%
Dpt of Zoology, University of Gothenburg	1	1%		0%
Evolutionary Biology, University of Basel	1	1%	1	2%
Federal University of Piaui, Parnaiba	1	1%		0%
Freiberg University of Mining and Technology	1	1%	1	2%
Ghent University	1	1%		0%
GITPAC	1	1%		0%
Global Biodiversity Information Facility	1	1%	1	2%
Hellenic Centre for Marine Research	1	1%		0%
Imperial College/Natural History Museum	1	1%		0%
INIBIOMA CONICET	1	1%		0%
Institute of Biology, Faculty of Natural Sciences	1	1%		0%
Instituto Tecnológico de Costa Rica	1	1%		0%
Macquarie University	1	1%		0%
Mantis Study Group	1	1%		0%
Marine Biological Laboratory	1	1%		0%
Medical University of Warsaw	1	1%		0%
Millersville university	1	1%		0%
Missouri Botanical Garden	2	2%	1	2%
Muséum National d'Histoire Naturelle	4	4%	1	2%
N/A	5	5%		0%
National Botanic Garden of Belgium	1	1%	1	2%
National Herbarium Netherlands	1	1%	1	2%
Natural History Museum, Copenhagen	1	1%	1	2%
Natural History Museum, London	28	26%	19	41%
Naturalis	1	1%		0%
Open University	3	3%	3	7%
Oxford e-Research Centre, University of Oxford	1	1%	1	2%
Plazi	1	1%	1	2%
Royal Belgian Institute for Natural Sciences	1	1%	1	2%
Royal Botanic Gardens, Kew	8	7%	6	13%
San Diego State University	1	1%		0%
Scottish Natural Heritage, Scotland	1	1%	1	2%

Smithsonian Institute - National Museum of Natural History	3	3%		0%
Spezielle Botanik, Johannes-Gutenberg-Universität Mainz	1	1%		0%
Texas A&M University	1	1%		0%
The Trust for Oriental Ornithology	1	1%	1	2%
Turin university	1	1%		0%
U.S. Department of Agriculture	1	1%	1	2%
Université de La Réunion	1	1%		0%
University of Alberta	1	1%		0%
University of Bonn	1	1%		0%
University of Guam	1	1%	1	2%
University of Illinois	4	4%	2	4%
University of New England	1	1%		0%
University of Turku	1	1%		0%
Uppsala University	1	1%		0%
Utah State University	1	1%		0%
Vietnam Forestry University	1	1%		0%
Zoologische Staatssammlung Munchen	1	1%		0%
	107		46	

* As were registered in July 2009

Annex 2. “Community of one”

Tabel 6. Reasons for absence of active members on Scratchpad site [n=14*, O /one]

Concern 1: the loss of control over quality

Respondent 1) “Protecting the data from misuse. Problem of getting people involved due to intellectual property rights and copyright (with images)”

Respondent 20) “Important to maintain taxonomic standards of catalogue. Aren't collaborators who have an overall knowledge of the family”.

Respondent 26) “Repository information rather than an active site. Only one editor to maintain taxonomic standards- quality control”

Concern 2: the early stage of the development of the site, several respondent thought is was too early to invite others to join in

Respondent 10) “At a very early stage in setting it up. Nature of the site is that it's a test site for other ideas”

respondent 18) “Want the site to be in a state that the developer is happy with before considering allowing active members (other academic researchers)”

respondent 27) “Didn't contact people (yet dd) to build a community due to technical hurdles”

respondent 31) “Not sure whether SP will pay off in the future”.

respondent 35) “Fairly early in development” (had more than one argument)

Concern 3: characteristics related to the target audience. The community was thought to be too small to get involvement either they lacked the expert background needed

Respondent 19) “There isn't a big community to collaborate on, site is on specific genus”

Respondent 30) “There is a gap between people working in different communities (fossil insects and insects), hard to bring them together”.

Respondent 35) “Small catchment area. Site is designed more for people without a background in termites, therefore they can't contribute”.

respondent 37) “Very small group involved in taxonomic group. Putting more stuff online might bring in more users”

Concern 4: (other)

respondent 41) Once site was set up, no one interested in using it. Collaborators thought it was important to have a site but not to be actively involved. Collaborators focused on other e-taxonomy projects. Also had grant been accepted site would probably have taken off.

Respondent 46) End products of various grants. Showing results of grant work.

*6 respondents didn't answer the question

Annex 3. Publishing work in progress

Table 7. Motives of users to *or not* to publish "work in progress" [n=39*, O /one]

Respondent	Motives
	<u>Users do publish work in progress for:</u>
	<i>Practical (project management) benefits</i>
4	Work in progress makes the information that you've got immediately available.
9	To collect data that would become part of Scratchpads is work in progress.
11	[to communicate] Private data for students.
12	Work in progress because intention for community to identify specimens on the site.
14	Private work in progress providing access for referees of work. A lot of data on the site would be crucial to future publications.
15	Advantage of work in progress is that you get input from other people.
18	Work in progress is going into other projects.
22	No need to hold information centrally or via emails.
25	Increases visibility - been able to share things with people in other institutions.
28	[to share] Work useful to members of the site not the public. Unpublished work will be private.
30	Making new slides with new insect wings - constantly ongoing.
34	Benefits that other people will come onto the sites and edit information. Could see using private areas.
35	Putting up pre-prints of chapters up on the Scratchpad.
	<i>Ideological motives</i>
33	Belief in Open Science, user feedback to make work more functional.
38	Privately available due to NASA collaboration. But generally intention to promote open science and open access.
	<i>Nature of the data or research subject makes sharing essential</i>
3	[to work on] Undescribed species information up on the database.
16	[small group to work on] Non-published DNA sequences which want to be kept private.
17	Interactive key is work in progress - data matrix behind it is constantly refined. Private planning material is only privately available to project members.
19	[to work on] new species descriptions
20	[to] publish material and unavailable information to the public (...) online. Personal research is up online.
21	Nature of taxonomic research on this group is constantly changing due to molecular research.
23	Bibliographic content is constantly being updated so is work in progress in its very nature.
27	Some unpublished information which wasn't large enough for publishing.
31	Milichiidae site- publish Milichiella revision. Possible private publishing in future if working with collaborators.
46	Easy way to publish data rather than traditional publication. Good for data rich publications. Much easier interface.
	<i>Social effects</i>
24	Generally it's good for drawing people into a project and to support collaboration within a project.
40	Getting people to push results out.
41	Collaborators were enthusiastic to publish work in progress. By publishing openly it would lead to increased inclusivity to reassure the community.
	<u>Users do not publishing work in progress because of:</u>
	<i>Technical barriers</i>
2	Struggled setting up a private group area for work in progress so not implemented yet.
	<i>Trust barriers</i>

31 Weary of pirates in the community.

Perfectionism

43 People would be uncomfortable with putting untested hypotheses

Deviation(s) of sites original services

1,6,26 Sharing is no the purpose of the site...only for already published material

Other motives

36 Publishing work in progress but not taxonomic work in progress.

37 Wouldn't put stuff up which goes on to publication.

29 [Perhaps in the future for the moment] intention to keep a log on future SP site.

44 [Prefer] to keep things private depending on colleague.

45 Possibly but [decision would be based] on cultural reasons not technical

*3 respondents didn't answer the question

Annex 4. How virtual reseach tools change collabarations

Table 8. How Scratchpads and other virtual research tools changed the way users collaborate [n=38, O/one]

Respondent	Summary of interview answer
1	There is a change. Makes communication faster and accessing information faster as well.
2	There is a change. Collaborators are much more linked in together (still a lot more progress to be made though).
3	Has changed - being able to talk to people directly through virtual conferencing. Being able to get information rapidly.
4	Not really because respondent doesn't do virtual collaboration.
5	There is a change. Incredibly useful tools, specific tools have been a great help to work. Increase data sharing
6	It has. Immediate contact. Able to find out who you need to talk to. Access and resources have opened up. Greater access of data. Everything's gone online.
7	N/A as respondent is not on the content side of virtual research tools (is a developer). Virtual research tools essential to respondent's job.
8	A slight change. Ability to put information up and store it on a common spot, makes things a lot easier.
9	Completely different. Especially blogs because they give you a platform that you didn't have before. Work in much smaller increments.
10	Certainly a change. Facilitates distributed collaboration.
11	Definite change. Greater speed of communication (e.g. instant messaging). Ease of finding resources and location within resources. Sharing data is much more efficient. Use of internet tools for conferencing.
13	Yes there is a difference. Such tools increase collaboration and editing from the internet community. Virtual research tools increase the quality of scientific data.
14	Main difference is that the respondent doesn't need to go to libraries anymore. Web based sharing outside of the Scratchpad isn't of importance.
15	Definite change as most things are done electronically. Online communication has dramatically changed the way we work.
17	There is a change. Speed of communication. Ability to work on shared documents has been revolutionised.
18	Tools have changed the way everyone's worked. Outside of email hasn't changed collaboration with others much.
19	Yes there has been a change. Greater access to information, faster communication.
20	Complex collaboration couldn't been able without the internet. Things are now faster, reach a number of individuals with the same information. Makes things much more efficient and productive.
21	Change beyond doubt. Completely different way of working. The work done now would be impossible without the use of web tools. Greater access to collaborators as well as information.
23	A large amount of change. Picking out what is related to virtual research tools is hard to define. Burgeoning of the Biodiversity Heritage library online has made a big difference. Internet tools are considerably important and very helpful. Caveats though of quality of articles on the web.
24	Yes it has - enabled people to work more efficiently and quickly.
25	Yes - ability to work remotely is much better.
26	Speeded everything up, people communicate more. Not restricted in waiting to publish something.
29	Big difference. All specimens are digitised. Always refer to virtual resources. Wouldn't work without

web based activities.

- 30 Online submissions is faster, check status of paper submission. But doesn't always work. Communication is so much faster. pdfs have made accessibility of information better. Greater collaboration between colleagues - everything is done faster.
- 31 Absolutely there's a difference. Virtually all work now sitting in-front of a terminal. Massive increase in collaborations. Before web very much working on one's own.
- 33 Extreme change. Making things open and public access is a relatively new thing. Increase in collaboration.
- 34 Changed the way the respondent's job is done. Really dramatic change to what it means to do taxonomy. Etaxonomy changes taxonomy from being an individual operation to a collective community. The possibility of having a complete taxonomic system is much greater with the web. Cost of etaxonomy is that everything looks unfinished, classical taxonomy wants complete systems. But etaxonomy offers the best picture. Internet invites more participation which is a good thing for taxonomy - makes it once again an attractive profession.
- 35 Definitely. Primarily - everyone expects everything to happen immediately. Getting up to speed and communicating is much quicker. Share data sets incredibly quickly. Collaborate instantaneously with people in different geographical regions.
- 36 Completely different landscape. Increase in accessibility of information. Original ways of publishing information.
- 37 Big change. Greater accessibility to data at all levels across the world.
- 38 Huge change. Would feel quite isolated if it weren't for online networking. Interact with people at other institutions and creating research networks.
- 39 Quite gradational change. Getting easier and different ways of sharing information (specifically images).
- 41 Has changed things. Made it possible to collaborate with other people in different countries on the same software.
- 42 Big change. Easier and more accessible. Eliminating lag times.
- 43 Not been in field before the rise of the internet. Have pointed people towards online materials.
- 44 Problem of awareness - big difference when colleagues are aware. Much more efficient to share information via web than email.
- 46 Made what you do a lot quicker. VRT even faster email communication.
-
-
-

Annex 5. User wish list for Scratchpads

Table 9. Users' wishes for improvement of the Scratchpad design

Respondent	First priority	Second priority	Third priority	Fourth priority
1	Pathway for uploading could be made easier and more intuitive.			
2	Better implementation of private groups.	Changes to things that are deeper in the site are difficult to realise. Something which highlights changes to the site.		
3	Improve way of browsing the data. Taxonomy browser doesn't work well.	Help making better views of the data.	Better linkage to other databases (to stop duplication of effort)	
4	Specialised module to be able the user to do transcription.	The text editor's annoying- can go haywire when you paste text into it.	Nice to be able to more easily customise the look of the pages.	
6	Quite clunky - needs to be better streamlined and more intuitive.			
9	Scratchpads should not be a one way system. There is downloading of data but no uploading of modified data from the site (feedback to the original source)	No integration with Plazi - seek out to see if treatments available on Plazi or similar sites and display them on Scratchpads.		
10	Scratchpads must be more intuitive.	Easier to enter, edit and manage information.	Development of suitable APIs for exchange of information with other online systems.	
11	Speed improvement on the administration site.	More intuitive command system.	Help files are jargon heavy and not focused on workflow needs.	Reduced investment required to use Scratchpad proficiently.
12	Simplify compiling of a species list.	Increased guidance from Scratchpad maintainers.	Ability to download data transparently.	
14	Continuity through different versions of Drupal.	Longevity - making sure the Scratchpads continue.	Being able to display videos (and media of all sorts - same container for all).	The way the taxonomy is implemented is very strange (e.g. with synonyms).
15	Increased web browser compatibility.	Editing data isn't logical.		

16	Tools for DNA sequencing.	When it comes to uploading data - make the process more streamlined.		
17	Ability to manipulate matrixes.	Impossible to run applets embedded in pages on Scratchpads.	Requirement to run keys within Scratchpad.	Difficult to get the volume of data up on the Scratchpad.
18	Simplified - easier and quicker to manage and manipulate their Scratchpads.			
20	Re-implement colour pad for text.	Re-implement ability to italicise headings - important for nomenclature.	More flexibility in implementation glossaries - improve ability to import larger number of terms.	
21	The taxonomy module needs to be fine tuned. (hierarchy and uploading)	Flickr image linking needs to be fine tuned. (greater filtering)		
22	Very difficult and confusing to set the access levels for information.	SP feels it offers less functionality then other Content Management Systems.	Menu headings feel unstructured.	
23	Dropbox system of automatically updating data online.	Direct linkage between the user's Scratchpad and Biodiversity Heritage Library (search level linkage).		
24	Different way to comment/amend/discuss other people's work - put comments in line with text (annotation).			
25	Information has to be packaged up in certain ways, not seamless process (e.g. with protected executable files).	Less flexibility to do internal drupal development within SP themselves (only trouble for developers).	WYSIWYG editor is clunky.	
26	Really clear instructions - seems to take forever to complete a task.			
27	Make SP more intuitive - make it more user friendly - some people aren't going to put the effort to figure out developer details.	Design set is too overwhelming - can get too complicated. Functionality and processes need to be speeded up - making use of web services	More documentation required.	
28	Interface is too clunky. Needs much greater usability.	e.g. aggregation of specimen data.	Avoiding duplicity of work.	
29	Not sure at the present			

	moment.			
30	Image data should be rooted to specimen images.			
31	Sharing information (synchronise) with other online sites.	Incredible level of simplicity added to the interface.	Bugs have to be removed.	
32	Easier to use.	Matrix editing. Better organisation of content - making it easy for people to react to items and discussions.	Bibliographic tool needs improvement.	
34	Make it easier for people to use the software.			
35	User interface is quite clunky. Hard without help.	Some systems on the site fail to work from time to time. Bit more support available to people. Need more of a development community.	Not very intuitive.	
36	Data export mechanisms need improvement.			
38	Technological barrier needs to be lowered.	More intuitive. Needs better pathway for uploading by users, commenting on images (comments can get lost in panels view).	Getter clearer design idea and focus on that. Quality and ease of use for a user hasn't improved.	
39	Lot more work needed on presenting and editing data.			
40	Get data in and out easily. Migrating data needs to be seamlessly.		Offline facilities would be good.	pdfs would be good - colleagues like printing out thongs.
42	Waiting for newer versions which will deliver what respondent needs	Get rid of data lock-in. Improvements in management of checklists Import type images and records from databases at institutions (e.g. on Berlin and Missouri websites).	Ability to publish data better	
43	The way names (taxonomy) is treated.		Generally speaking maximising import ability.	
44	Ability to record ecological relationships.			
45	Doesn't deal with taxonomy properly. Not specialised towards taxonomy enough.	Image handling isn't great. E.g. ordering, no imbedded meta-data. i.e better galleries	Managing the content could be more intuitive. Primitive.	
46	Increased usability for the active members	Speed improvements on the site		

Annex 6. Interview questions

Table 10. Interview script with questions as used by interviewer*

Questions
1 How did you first hear about the Scratchpads?
2 Why did you register for a site?
3 When was the last time you logged in?
4 Are you planning to continue to use Scratchpads in the future?
5 How many Scratchpads do you have?
6 How would you describe your contributions to your site(s)? If you have more sites refer to the collective of contributions.
7 Do you contribute to other people's Scratchpads?
8 Can you confirm on what taxonomic group(s)/subject(s) your site(s) are?
9 How (to do what) are you using your Scratchpad(s)? Please specify for each Scratchpad separately.
10 Next to your own participation how many other active members have subscribed to your site(s)?
11 Did the respondent answer for one of the Scratchpads that it has "one or more members" (1 ≥)?
12 How many of the active members of your Scratchpad site did you know before your Scratchpad collaboration? If you have more than one site please give an approximate number for the total number of sites.
13 In the previous question you mentioned you knew [X] number of your site members before your Scratchpad collaboration. Here we would like get a global idea on the level you were acquainted with each other the moment you started your Scratchpad collaborate
14 How would you describe your responsibilities in your Scratchpad community? If you have more than one site please refer to the site with the highest number of members (if sites have equal number of members discuss the site you work most on)
15 Is there a specific reason(s) that your Scratchpad(s) is/are a community-of-one? if you have more than one community-of-one site refer in your answer to the collective of your sites.
16 What do you perceive as the main benefits of the Scratchpads to your work? If you have more than one site describe the overall benefits of the collective of your site
17 Are your Scratchpads achieving the goals you have set? If you have more than one site please refer to the collective of your sites.
18 Can you tell us what prevents you from achieving these goals? If you have more than one site try to describe the most important barriers that you encounter for the collective of your sites.
19 Do you publish your work in progress on your scratchpad(s)? if so what is the level of openness?
20 You did/did not/intend to do in the future/ publish your work in progress. Can you tell us: why so? What are the benefits to your work? - or why not? What are the disadvantages to you? - Or why do you intend to do so in the future?

- 21 Has there been a spin off (s) related to/triggered by your Scratchpad site? If you have more than one site refer to the collective of your sites.
- 22 What is the target audience(s) of your site(s)? If you have more than one site respond for the collective of your sites.
- 23 Are you satisfied with the impact of your site(s)? In other words: do you reach your target audience? If you have more than one site please describe the impact for the collective of your sites.
- 24 Do you agree with the statement: "The Scratchpads as they are designed today will need further improvement to fulfil my research needs".
- 25 Can you tell us what has to change or added to the Scratchpads design in order to (better) fulfil your needs?
- 26 Have you used any of the help and feedback options (e.g. The Scratchpad forum, the blog, viewed any of the help videos), or had direct contact with the developers?
- 27 Are you satisfied with the feedback options for the Scratchpads and responsiveness of the developers?
- 28 Are you using Virtual Research tools (other than Scratchpads)? (e.g. Blogs, forums, other web based software, no -email) as part of your research work?
- 29 What virtual research tool(s) are you using?
- 30 How often do you use the tools that you mentioned?
- 31 With how many people do you interact for your work using the tools that you mentioned? Please give an approximate number.
- 32 What is the context of these collaborations?
- 33 Question deleted
- 34 Is there support in your institution for the use of virtual research tools? At what level?
- 35 What is the main way you communicate your research?
- 36 Have the tools that you use changed the way you worked with others? Compare this with how you worked before the rise of the Web. Is there a difference? What is your opinion of this change?
- 37 Which of the following reflect the ways in which you do your research?
- Question 38- 55 for Scratchpad quitters similar to above questions on virtual research tools**
- 38 After signing up you decided not to use the Scratchpads (anymore), why not? What turned out NOT to be as you thought it would be? Did you encounter specific barriers when using Scratchpads? If so how would you describe these barriers?
- 39 Are you using virtual research tools other than Scratchpads? (e.g. Blogs, forums, other web based software) as part of your research work?
- 40 What virtual research tool(s) are you using?
- 41 How often do you use the tools that you mentioned?
- 42 With how many people do you interact using the tools that you mentioned? Can you give an approximate number?
- 43 What is the context of these collaborations?
- 44 How many of the people you interact with by using the virtual tools did you know before your virtual collaboration?

- 45 In the previous question you mentioned you knew [X] number of your site members before your virtual collaboration. Here we would like get a global idea on the level you were acquainted with each other the moment you started your virtual collaboration.
- 46 What do you perceive as the main benefit(s) of the virtual research tools to your work? If you use more than one tool describe the overall benefits.
- 47 Are the tools you use achieve the goals you have set for your work?
- 48 Can you tell us what prevents you from achieving these goals? If you are using more than one tool describe the most important barriers that you encounter for the collective of your sites.
- 49 Do you publish your work in progress by using virtual research tools? If so what is the level of openness?
- 50 You did/did not/intend to do in the future/ publish your work in progress. Can you tell us: why so? What are the benefits to your work? Or why not? What are the disadvantages to you? Why do you intend to do so in the future? What b
- 51 Have the tools that you use changed the way you worked (with others)? Compare this with how you worked before the rise of the Web. Is there a difference? What is your opinion of this change?
- 52 What is the main way you communicate your research?
- 53 Is there support in your institution for the use of virtual research tools? At what level?
- 54 Which of the following reflect the ways in which you do your research?
- 55 Are there tools you would like to see changed or developed, if so, what kind and to do what?
- 56 You say you're not using any virtual research tool. But could you tell us: A) how do you communicate your research (what tools do you use) ? B) how do you collaborate (what tools do you use) ? C) and how do you organise your data (what tools do you u
- 57 Can you confirm your name?
- 58 Can you confirm the institution and country where you are primary based?
- 59 Can you confirm your email address?
- 60 What is your age?
- 61 gender respondent
- 62 What is your position?
- 63 What is your specialization, on what taxonomic group/ scientific subject do you primarily work on?
- 64 How many people worldwide are working on the same taxonomic group/subject as you? [also incl. Non-professionals that publishing at academic level]
- 65 Is there something you would like to say or ask us? Or is there something we didn't cover in the interview and you would like to discuss?
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* The interviewer followed different "routes" through the script. Depending on the user category respondents were diverted to a sub-set of the questions.

Annex 7. Figures and tables

Order of appearance	Title	Question number
Figure 1	Population. Countries maintainers are based	None
Figure 2	Sample. Countries where maintainers are based	None
Figure 3	Population. Content of sites	None
Figure 4	Sample. Content of sites	8
Table 1	Age group respondents	60
Figure 5	Users and their estimation of the number of their colleagues working on the same taxonomic group (or subject	64
Figure 6	Job position Scratchpad users	62
Figure 7	Number of users and how they do research off-line	37 + 54
Figure 8	Number of users and the most important way(s) they communicate research	35 + 52
Figure 9	Number of users and usage of virtual research tools other than Scratchpads	28 + 39
Figure 10	Number of users and number of times they virtual research tools, other than Scratchpads	30 + 41
Table 2	Usage of virtual research tools other than Scratchpads. Tools that were mentioned more than once	29 + 40
Figure 11	Number of users and sub groups of virtual collaborators when using virtual research tools other than Scratchpads	32
Figure 12	Number of users and approximate number of people they interact with	31
Figure 13	Number of users and why users register for a Scratchpad site	2
Figure 14	Number of users that plan to continue to use Scratchpads in the future	4
Figure 15	Number of users and last time users logged on their Scratchpad site	3
Figure 16	Number of users and how they heard about out Scratchpads	1
Figure 17a	Number of users and different uses of Scratchpads	9a
Figure 17b	Number of users and different uses of Scratchpads	9b
Figure A	Number of users and how they describe the contributions to their sites	6
Figure B	Number users and their contribution to other Scratchpads	7
Figure 18	Number of users and number of sites they manage	5
Figure 19	Number of users that have at least one site with ≥ 1 "members" and number of users who manage instead one or more sites that are a "community of one"	11
Figure 20	Number of sites and number of active members per site. For 4 sites no information was given.	10
Figure 21	Number of users and number of community members they were acquainted with before they started collaborating on their Scratchpad site	12
Figure 22	Number of users and level of acquaintnss between maintainer and members	13
Table 3	Users' main reasons why Scratchpads are a "community of one	15

Figure 23	Number of users and their responsibilities in Scratchpad community	14
Figure 24	Number of users that “publish work in progress”	19
Figure 25	Number of users and different target audience of the sites.	22
Figure 26	Number of users and achieving goals set for Scratchpads.	17
Figure 27	Number of users and their satisfaction with impact of their site(s).	23
Figure 28	Number of users and Scratchpad spin-offs. Reference is to the collective of the sites of each respondent	21
Figure 29	Number of users and what they see as the main benefits of the Scratchpads	16
Figure 30	Number of users and most important barriers to achieve goals set.	18
Table 4	Barriers encountered that turned users (called leavers) away from Scratchpads	38
Figure 31 + 32	Number of users and institutional incentives to use virtual research tools	34 + 53
Figure 33	Number of users and their view on Scratchpads development stage	24
Figure 34	Number of users who said to have used the help and feedback options	26
Figure 35	Number of users and satisfaction with Scratchpad” help” facilities and services 27	
Table 5	Institutional affiliations of population of Scratchpad maintainers* versus the group of interview respondents	58
Table 6	Reasons for absence of active members	15
Table 7	Motives of users to <i>or not</i> to publish “work in progress”	20
Table 8	How Scratchpads and other virtual research tools changed the way users collaborate	36 + 51
Table 9	Users’ wishes for improvement of the Scratchpad design	25
Table 10	Interview script with questions as used by interviewer*	None

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