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This exploratory study analyzes the attitudes toward Free and Open Source Software (FOSS) on the campus on the University of North Carolina at Chapel Hill. The study focuses primarily on the monetary incentive of FOSS given the unusual set of circumstances in academia, including academic pricing and site licensing. The study finds that listserv surveys are not an adequate way of doing research on the tech community at UNC-Chapel Hill, especially in the arts, humanities and social science departments. Study respondents also indicate there is little inter-departmental social networking that occurs in survey responding. There is also strong incentive to use proprietary software due to site licensing.

Headings:

Software - open source
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FREE AND OPEN SOURCE SOFTWARE AND SOFTWARE ACQUISITION COSTS

by
Douglas A Whitfield

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Approved by

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Advisor Paul Jones

Table of Contents

Introduction

The purpose of this study was to gain insight into the culture of the University of North Carolina-Chapel Hill (hence UNC) technology community regarding attitudes and preconceptions about Free and Open Source Software (FOSS) within the context of financial responsibility and specifically with concerns about the way site licensing affects tax payer and tuition dollars. While the survey designed for and used in the study (Appendix A and Appendix B) specifically avoids asking total cost of ownership (TCO) questions due to the complicated nature of TCO and its dependence upon the current intellectual capital of the organization, the open-ended nature of the questions allows for participants to discuss TCO issues. While on the topic of TCO, it is worth noting that the longer proprietary intellectual capital builds up in an organization the harder it will be to move to FOSS. If there is going to be a move to FOSS in an organization, it is better to do it sooner rather than later. A planned intellectual capital shift (such as recent changes to Vista and Microsoft Office 2007) is a particularly good time to re-evaluate an organization's use of FOSS (Pfaffman, 2007). Even though the initial cost of a change in technology can be high, Forrester explains in "The Costs And Risks Of Open Source" that companies should expect "[TCO] to go down as they [gain] more experience" (Giera, 2004). This same phenomenon of deferred benefits can also been seen in energy efficient devices such as hybrid cars. The initial cost of a hybrid car is more expensive, but in the long run the efficiency can (depending on a large set of variables, like TCO) pay for itself (Kaho, n.d.).

While finance is the main purpose of this study, researchers attempted to gather other indirect knowledge such as documentable differences in software use in varying academic disciplines. While it may seem obvious that the English department does not use as much software as the Computer Science department, no data could be found on this subject. While this is not the primary focus of the study, such information can be used in designing future studies. While there was a clear hypothesis that open source software will save money, academic discounts and the campus-wide site license agreements make any sort of pre-formed judgment about acquisition costs entirely speculative, even in the less stringent lay definition of the word.

What is Open Source and Arguments for Use

Free and Open Source Software (FOSS) is software that is legally free to distribute and modify. The ability to modify the software is an important distinction from what is known as freeware. Members of the Open Source Initiative (OSI) are the self-described "stewards of the Open Source Definition" (Tiemann, 2006). Their complete definition can be seen in Appendix C. One can think of FOSS as similar to a Creative Commons license (Creative Commons, 2008).

There are four main arguments as to why FOSS is better than alternatives:

1) It creates a competitive market place
2) It is less expensive (related to number 1)
3) It produces better software
4) It is more socially responsible.

FOSS creates a competitive market in the same way that the auto mechanics

industry is competitive (Whitfield, 2007). For most things, one does not have to take his or her car to the dealership. Anybody (including the owner of the car) is legally able to open the hood and repair or modify the engine. If, however, the Ford, Acura, etc. dealership locked the hoods of their cars and made customers sign a contract saying they would not open their hoods, one would have a situation similar to Microsoft or Adobe's policies. It may be that the dealership is the best place to go, especially for more serious issues, but having to potentially drive several miles just to get an oil change is not only environmentally and economically unsound, but also simply a nuisance. Once anybody can legally do the work, someone can offer a lower price or better service and competition is created. For example, Oracle offers support for Red Hat Enterprise Linux (RHEL) at a reduced cost (Vaughan-Nichols, 2006). One might argue either service is better, which is precisely the point. There are options, unlike the support for Windows, which only comes from Microsoft.

Fundamentally, FOSS is inexpensive because the code is cost free. There is some argument about this because one may have to pay for bandwidth usage or a CD, *et cetera*., but the actual code does not have a price tag. However, "free as in price" is not the only way in which FOSS is less expensive. A competitive market can drive a better product (as Firefox has forced improvements in Internet Explorer); it can also drive the price down (Wheeler, 2007). Lastly, FOSS is driven on volunteer labor. This is not to say big projects like Linux and Solaris do not have paid staff working on the code, but being able to leverage any amount of volunteer labor keeps costs down (Byfield, 2005). The FOSS model has allowed Red Hat to be #1 in enterprise software according to CIO Insight the last four years and #1 overall three of the past four years (Red Hat, 2008).

The third argument, which is very important to business users, is the hardest to argue. Defining “better” is up to an individual. Is better more secure, easier to use, prettier, more compatible or something else? Three of the main arguments behind FOSS' ability to produce better software are that bugs get fixed quicker, programs tend to be more modular and there can be more of a focus on usability (Rapoza, 2002; Bessen, 2005). However, a good proprietary company can fix bugs quickly, use modular programming techniques and have a user focus. Very few would deny that bugs getting fixed quicker is good. However, neither effective programs nor FOSS must be modular. FOSS tends to be more modular because there are many people building what they want to use. If developer A wants a module to do activity A, s/he builds it. Another programmer may want a module to do activity B, so s/he builds one independent of A's module. Perl's CPAN database, Firefox's Add-on site or any number of FOSS programs with additional user programmed add-ons is proof of this. This brings up the third argument as to how FOSS is better. FOSS is more user focused; the developers are also users (Hertel, 2003). This, however, can also be used as a counter-argument defending proprietary software as the argument could be made that FOSS is made for developers, not for customers, though FOSS companies clearly also have customers (DiCarlo, 2007). Again, defining better is up to the individual, though there are several places in which it can easily be argued that the FOSS model produces better software.

Lastly, many people believe that FOSS is more socially responsible. There are at least three ways in which this can be argued. First, poor students, governments, etc. can use FOSS free of charge, thus allowing self-determination rather than capitalistic determination. Many proprietary companies give academic discounts, but there is still

cost associated with the software, which can be significant, especially as some students' families struggle to put food on the table. Secondly, FOSS allows users to translate programs into their native languages (Haywood, 2003). While this is not a concern for UNC, it is a concern for those in the Basque region of Western Europe and for other native speakers of lesser-used languages (i.e., smaller markets for selling software) around the world. With proprietary software, users are forced to use a dominant power language such as English. While this is a concern for cultural heritage, the more immediate concern is that individuals will simply not be able to use the software, stunting their educational and/or economic progress. Lastly, and this is what is most important for a state institution such as UNC, FOSS (and open standards) allow for better document retention (Teper, 2002). For instance, if Adobe stops making products that support it's psd format, any psds that exist could be lost since no other programs can handle psd files. It is possible that Adobe could create conversion tools, but these potential conversion tools could be prohibitively expensive. It is certainly possible for proprietary software to use an open standard, so in this case the standard is really the issue, but FOSS products tend to use open standards while proprietary software does not. This is a complicated issue, but it is one certainly worth considering when purchasing software, especially at a publicly funded institution with public documents.

There is a fifth reason that academic institutions in particular should consider FOSS. While knowing *a tool* (i.e. Windows or Photoshop) is great, many argue that knowing how to use *tools* is much more important (Pfaffman, 2007). In this argument, more than one operating system should be used, at least one of which should be FOSS so that students and future leaders of the state and nation understand what is available at no

cost. The argument is that one learns to drive a car, not a Honda or Ford. Software should be a similar experience. The lessons learned on Windows are applicable to Linux, though many people are afraid of technology and do not understand this.

Monetary cost, the second reason given for using FOSS, is the focus of this study, but the other reasons are highly influential in why the study took place and why further studies on FOSS at UNC should be undertaken.

Methodology

Surveys were initially sent to the CTC (Carolina Technology Consultants), Vista, Support and OSSWG (Open Source Software Working Group) campus listservs soliciting IT managers to respond (e-mail can be seen in Appendix D). A follow-up e-mail was sent after ten days (follow-up e-mail was identical to initial e-mail with a statement added that it was the follow-up e-mail). These four listservs were chosen for their open nature and size. For instance, there are lists I could not join since I was not an ITS employee. The CTC list included 510 members when the survey was sent, while support included 280 members, Vista 257 members and OSSWG 32. OSSWG was a new organization when the surveys were sent, but the list was picked to balance the proprietary nature of the Vista list. Thus, there were two very broad lists and two smaller, specific lists. One note about the Vista list is that it included individuals from other institutions of higher learning, such as Wake Forest, though I did not receive any responses from anyone at other schools and had I done so, they would not have been included. The Vista list is used to discuss implementation problems and ideas in large academic institutions. While the list is housed at UNC-Chapel Hill, the administrators thought it best to share

information with other institutions. The initial e-mail to managers did not initiate much response, so a change in the initial protocol was made such that any IT employee could respond to the survey (Appendix E). The four lists were notified of the change in protocol and then ten days later reminded about the survey and the change of protocol.

Results

In this section, there are fourteen charts, one graph, each followed by a brief explanation to help elucidate the survey responses.

The responses can be broken up by department below:

CHART 1: University Divisions Responding to Survey

College of Arts and Sciences
- Department of Biology
- Marine Science

Frank Porter Graham Child Development Institute

Student Affairs
- Information Technology

School of Public Health
- Biostatistics

University Advancement

University Libraries
- Health Sciences Library

Micro Medic

ITS Telecommunications (recently renamed ITS Communication Technologies)

Interestingly, only one person from ITS (the campus monolithic IT group)

responded to the inquiry. While I do not have an exact count of ITS employees, the organization web page states ITS Manning has space for 220 staff members and ITS Franklin has over 200 employees. Since there are ITS employees in other buildings, such as the Undergraduate Library, estimating 420 employees would be conservative. That is less than 0.24% of ITS responding to the survey. Now, it is true that all ITS employees might not be on any of the the support, CTC, Vista or OSSWG listservs, but the low number of responses seems strange, considering there are over 500 people on the CTC list. Further discussion on low survey response is included in the "Future Research" on page 23.

CHART 2: Topical Clustering of University Groups Responding to Survey

Natural and Health Sciences
- Department of Biology
- Department of Marine Science
- Frank Porter Graham Child Development Institute
- Biostatistics
- Health Sciences Library
- Micro Medic

Administration and Support
- Student Affairs Information Technology
- University Advancement
- ITS Telecommunications (recently renamed ITS Communication Technologies)

Social Sciences, Humanities and Arts
- *no respondents*

Notice in CHART 2 there are no respondents from the Social Sciences, Humanities or Arts. If one includes the two individuals who responded with critiques of the study (but did not respond with actual survey responses) the picture is even more skewed, as seen in CHART 3.

CHART 3: Topical Clustering with Non-participating Responses

Natural and Health Sciences
- Department of Biology
- Department of Marine Science
- Frank Porter Graham Child Development Institute
- Biostatistics
- Health Sciences Library
- Micro Medic
- DENTISTY*

Administration and Support
- Student Affairs Information Technology
- University Advancement
- ITS Telecommunications (recently renamed ITS Communication Technologies)
- OASIS*

It may not be fair to lump OASIS with Administration and Support, since other than the Marine Science professor, all of these individuals really fill support roles, for their individual departments. OASIS supports all of Arts and Sciences, which includes some humanities, social sciences, arts and natural sciences. It is interesting that no one from the Computer Science (CS) or Information Science (IS) departments responded, since the two departments are considered technology hubs on campus. Working with the Carolina Open Source Initiative, the topic of CS involvement often came up. This survey is further evidence in their isolation from the rest of campus. This isolation may be simply because it is the departments' job to do research, not run the campus. That is the job of Information Technology Services (ITS). It may also be the case that members of ITS feel threatened by CS and IS. It is quite possible that given a different venue, say direct contact, that members of CS and IS would have participated.

One last classification including non-participant e-mails is displayed in CHART 4.

CHART 4: Classification Scheme with Non-Participant E-mails

Health Campus
- Health Sciences Library (Appendix F)
- Biostatistics (Appendix G)
- Dentistry*
- Micro Medic (Appendix H)

Arts and Sciences
- OASIS*
- Biology (Appendix I)
- Marine Science (Appendix J)

Administrative
- University Advancement (Appendix K)
- ITS Telecommunications (Appendix L)
- Student Affairs (Appendix M)

Other
- FPG Child Development Institute (Appendix N)

The College of Arts and Sciences claims it "awards over half of all degrees granted by the University." While one might think that these are mostly undergraduates and that graduate students, which require more computing support, might be on the health side of campus, The College actually has "the largest percentage of graduate students at the University" (College of Arts and Sciences, UNC-Chapel Hill, 2008). For the sake of simplicity, CHART 4 will be the grouping used for the remainder of the survey questions. This gives the most parity between the subdivisions and has some reason for existence based on the organizational chart of the Chancellor's Office (Appendix O). Each "Administrative" group has its own Vice Chancellor (VC). There is a VC of Medical Affairs. The Dean of Arts and Sciences reports to the Provost and FPG's interdisciplinary nature fits well in an "other" category.

CHART 5: More Computer Intensive than Other Campus Groups or Not?

Health Campus
- Health Sciences Library = yes
- Biostatistics = yes
- Micro Medic = no

Arts and Sciences
- Biology = moderately
- Marine Science = yes

Administrative
- University Advancement = yes
- ITS Telecommunications= yes; "very"
- Student Affairs = equal to most

Other
- FPG Child Development Institute = yes

Six of nine respondents say their division is more computer intensive than the rest of campus. Considering how much of campus is not represented in the survey results, their self-evaluation seems plausible, especially if they are considering themselves as part of the IT division of that group and not as the group as a whole, which some respondents seem to do.

CHART 6: Total Budget of Group

Health Campus

Health Sciences Library = Approximately $125,000.00 for FY07-08
Biostatistics = $200,000
Micro Medic = did not respond

Arts and Sciences
Biology = did not respond
Marine Science = did not respond

Administrative
University Advancement = did not respond
ITS Telecommunications = approximately $6million per year
Student Affairs = $600,000 - $700,000

Other
FPG Child Development Institute = ~$500K

Only five of nine responded to this question. Since these are not itemized, some respondents could be including salaries and others might not. The two smallest figures are on the health side of campus, perhaps because the departments are more granular on that side of campus.

CHART 7: Software Budget

Health Campus
- Health Sciences Library = $15,000.00 - $20,000.00 (12 -16% total budget)
- Biostatistics = $20,000 (10% total budget)
- Micro Medic = did not respond to question

Arts and Sciences
- Biology = at least "a few thousand a year"
- Marine Science = ~$0, FOSS exclusively (0% total budget)

Administrative
- University Advancement = $20,000
- ITS Telecommunications = ~$0, FOSS exclusively (0% total budget)
- Student Affairs = $20,000-$30,000 (2.9-5% total budget)

Other
- FPG Child Development Institute = $5000 (1% total budget)

While percentages are missing for Biology and University Advancement, cursory inspection suggests the Health Campus spends more of a percentage of its budget on software than do other campus groups.

CHART 8: Number of Programs

Health Campus
- Health Sciences Library = 40
- Biostatistics = 72
- Micro Medic = did not respond to question

Arts and Sciences
- Biology = at least 200
- Marine Science = did not respond to question

Administrative
- University Advancement = did not respond to question
- ITS Telecommunications = ~50
- Student Affairs = 30

Other
- FPG Child Development Institute = dozens to hundreds

Asking how many programs a division uses, like the size of the budget, helps to see if their self-perception about the size of their organization is accurate. However, it should be noted that other social and technology variables could have been used, such as disk space used, CPU cycles used or computer/human ratio.

CHART 9: Number of FOSS Programs

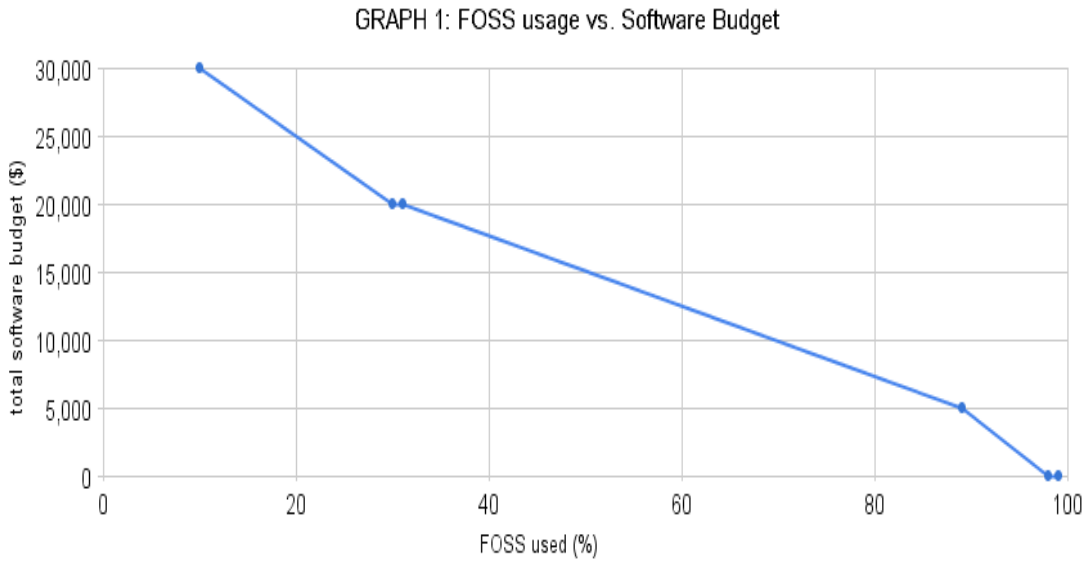
Health Campus
- Health Sciences Library = 12 (30%)
- Biostatistics = 22 (31%)
- Micro Medic = did not respond to question

Arts and Sciences
- Biology = 50 (25%)
- Marine Science = statement contradicts earlier FOSS statement; perhaps discussing his particular lab, then Marine Science more broadly

Administrative
- University Advancement = 1
- ITS Telecommunications = 49 (98% FOSS)
- Student Affairs = 2 -3 (6.7%-10%)

Other
- FPG Child Development Institute = dozens to hundreds (less than 90% FOSS)

Having worked for University Advancement, I know the respondent count of one FOSS program to be inaccurate as both Linux and FileZilla are both used in addition to Firefox. ITS self-reported 99% FOSS, but their numbers of 50 programs and 1 proprietary program mathematically are 98% FOSS.



While six data points cannot serve as grounds for statistical significance, the graph is rather striking. The groups used here are the six that gave both dollar figures for software budget and a percentage of FOSS programs used. From most to least money spent on software, those groups are Student Affairs, Health Science Library, Biostatistics, FPG Child Development Institute, ITS Telecommunications and Marine Biology. As the percentage of FOSS used goes up, the total software budget goes down. The graph does not work as well with percentage of budget spent on software. This could be due to a threshold level in software cost. For instance, server software costs more than client software and organizations that use proprietary server software may have a lower bound on actual software cost, but percentages for one piece of $7500 software, such as the Health Science Library uses may be very different. What this graph also indicates is that the site licensing model is failing some departments. The two "FOSS exclusive" organizations still use Windows from site licensing, but maintain a zero dollar software budget. Another item that may help dictate this graph and others is the number of in-house programs used. For instance, many web applications are built in-house, and it is

not known whether organizations included web applications in their statistics. In-house code gives the benefit of being able to see the code, much like FOSS does, though the user base is much smaller and there is no where to go for outside support.

CHART 10: Most Costly Software License

Health Campus
- Health Sciences Library = Marathon EverRun (fault-tolerance/failover) – $7,500.00
- Biostatistics = Platform LSF - $24/per CPU, if multi-core add $12. Overall cost/year $1,684.00
- Micro Medic = Department Manager which is a product of IT Works in Raleigh

Arts and Sciences
- Biology = Adobe products and server software.
- Marine Science = "users would never be aware of the cost"

Administrative
- University Advancement = Novell Network Operating System - $7,000
- ITS Telecommunications = 0% (Windows costs them nothing due to site licensing)
- Student Affairs = PyraMED in campus health

Other
- FPG Child Development Institute = Teleform automated scanning software

While the most interesting things about CHART 10 come from comparisons with CHART 11, it is interesting to note that while Student Affairs is grouped here with Administrative, the most costly piece of software in that division is actually health care software. This means that CHART 1 could arguably only have two groups in Administrative, University Advancement and ITS Telecommunications, since pieces of OASIS deal with natural science.

CHART 11: FOSS Alternatives to Most Costly Software License?

Health Campus
- Health Sciences Library = No
- Biostatistics = Yes
- Micro Medic = No

Arts and Sciences
- Biology = Yes
- Marine Science = when referring to others in Marine Science, "Yes. SciPy and Matplotlib provide a complete replacement and compatibility layer for Matlab. And GRASS and other tools provide a complete replacement for ARC. The main engine for ARC is even a piece of FOSS software which is dual licensed to ESRI for commercial use."

Administrative
- University Advancement = No
- ITS Telecommunications = n/a
- Student Affairs = "No, there are no FOSS clinic / ehr management solutions"

Other
- FPG Child Development Institute = No

CHART 11 provides thought provoking data. Biostatistics knows there is a FOSS alternative to their most expensive software license, but provides no explanation for choosing expensive software. That respondent even goes on to say (CHART 13) that they look for FOSS and (CHART 14) that cost is the main incentive for using FOSS. Biology also states that they believe there are FOSS alternatives to the department's most expensive license. However, Biology states that they do not seek FOSS due to "higher man-hours and cost of maintenance." Further clarifying the respondent's belief that "the purchase price of the software is usually not the higher cost component." Additionally, Student Affairs believes "there are no FOSS clinic / ehr management solutions" but Wikipedia lists several, as does Linux Med News (Johnson, 2004). Is this a case of a

proprietary paradigm causing groups not to look for FOSS? This conclusion seems peculiar as in CHART 14 the same respondent states "I believe that FOSS can fulfill many of our needs and provide a long-term sustainable solution for us."

CHART 12: Firefox Promoter

Health Campus
- Health Sciences Library = Yes
- Biostatistics = Yes
- Micro Medic = Yes

Arts and Sciences
- Biology = no
- Marine Science = no; users have choice

Administrative
- University Advancement = no; users have choice
- ITS Telecommunications = "We don't use IE."
- Student Affairs = yes

Other
- FPG Child Development Institute = yes

Some of the statements against Internet Explorer (IE) were emphatic, but they just as often came with a disclaimer that UNC web applications are built with IE specifically in mind. The only group that did not qualify their support of IE in some way was Biology, though the respondent did not suggest they use IE, only that they do not actively promote Firefox.

CHART 13: Seek FOSS?

Health Campus
- Health Sciences Library = yes
- Biostatistics = yes
- Micro Medic = "I usually install 7-Zip and PDFCreator when setting up new PC's, but the user will complain and request WinZip and Acrobat even though they will never do more with Acrobat than printing Word files to pdf's."

Arts and Sciences
- Biology = no
- Marine Science = sometimes (again, a statement contradicting the earlier comment of 100% FOSS)

Administrative
- University Advancement = yes
- ITS Telecommunications = yes
- Student Affairs = yes

Other
- FPG Child Development Institute = yes

Again, the open ended nature of the question allowed users to mention site licensing, though the overwhelming percentage of respondents are actively seeking FOSS. Unfortunately, their interest in FOSS is probably the reason they responded to the survey. The one individual where the department does not seek FOSS is a personal friend of the Principle Investigator.

CHART 14: Mention Site License/Culture as Reason for Not Seeking/Using FOSS?

Health Campus
- Health Sciences Library = no
- Biostatistics = no
- Micro Medic = yes

Arts and Sciences
- Biology = no
- Marine Science = yes

Administrative
- University Advancement = no
- ITS Telecommunications = no
- Student Affairs = no

Other
- FPG Child Development Institute = yes

While the University Advancement answer in CHART 14 does not mention site licensing or culture, having worked there I know that site licensing is a major reason for the lack of effort in pursuing FOSS. In many of the other questions, specifically Internet Explorer-related, the respondents do mention culture and site licensing as reasons for not using FOSS. There is no suggestion of problems with site licensing in the Health Sciences Library, Biostatistics and Biology. Perhaps the reason for the cluster of these groups in biological sciences is that the Health Campus is sufficiently buffered from the culture of the rest of campus. While Biology is part of Arts and Sciences, geographically their buildings are on the health portion of campus and, unlike many other departments, Biology is housed in at least three different buildings, their sheer size suggesting a certain amount of cultural autonomy.

Future Research

From the beginning, it seemed likely that the most useful information coming from this survey would be on how best to collect further data, including which parts of the university would require the most diligent research. For instance, the initial speculation was if departments in natural science spent the most money on software, that would be the best place for future research since it would have the biggest payoff if costs could be reduced. Of course, it is not quite that easy, because there are other factors such as student/faculty population, etc., but it would be a starting point for enacting change. While the data and brief comments were included in the Results section, here there are specific points in which to move on with further research.

There are several potential ways to improve upon this study. Targeting individuals for interviews (or simply targeting them for surveys) could help enroll participants. Asking people personally beforehand if they can fill out a survey would give a better indication of potential respondents. If individuals are too busy, more potential respondents could be targeted. A good amount of participants would be fifty, if a survey was to be done. The IT directors for the various departments, as was the original intent of this project, would be the best people for financial information. However, these individuals are also the busiest individuals in IT and thus plenty of time would be needed to arrange for interviews or for survey completion. Singling out specific individuals may also have a tendency to promote bias. For instance, since I promote and use FOSS, I tend to know others that promote and use FOSS.

A campus-wide effort would be one way to conduct further research, but one could also focus the research on specific departments. Since ITS is the primary

computing body on campus, a focused studied on ITS could be very helpful. Likewise, IS and CS departments would be potential locations for focused efforts. Since there was no response from any social sciences, humanities or arts, a focused effort would be good in those departments simply to have some data. *Visa versa*, since the natural sciences, and particularly health sciences, responded most in this study, asking those departments to participate again may be good since individuals there see the value in participating in research.

Incentives for participating and random in person surveys might also be helpful. At an institution with frequent budget cuts IT groups may be understaffed or have old, failing equipment and staff may not have time to respond to a survey unless they have an extra incentive (Clayton, 2002). In the case of a prize, grant money would be needed for purchase or a local vendor would need to donate the item. However, this can also set up bias, as if an iPod were the incentive, it would tend to draw a more Apple friendly crowd to the survey. On the other hand, a non-tech incentive may not reach the target audience appropriately.

While there are many ways in which the study could be changed either in benefit of gathering the same type of data, or expanding and enhancing the date, one as to yet unmentioned demographic is students. If research were to be expanded to students, surveys could be handed out during class changes in high traffic areas. While the questions for a student survey would likely be different, little is known about what students know about FOSS, or how they feel about their tuition dollars going to potentially wasteful endeavors.

Conclusion

The most practical conclusion to draw from this research is that more research needs to be done. Another interesting cursory point is what seems to be the lack of social networking taking place for the survey. While much recent research focuses on online social networks such as Facebook, here the relationship is mostly focusing on those which work together (Gross, 2005). While it is true that those individuals on the health side of campus may know each other, my knowledge of the university ecosystem is that these departments have little interaction with each other. Of course there are other potential personal bonds, but departments doubling up (for example, two responses from the ITRC [Information Technology Response Center]) would suggest at least the possibility of social engineering, and there is very little to suggest that in the responses gathered here. Basically, it seems no one told anyone else about the survey. This suggests that in future research social networking should either be encouraged (i.e. ask participants to pass the survey to co-workers) and/or unsolicited social networking should not be expected to enlist survey participants. Additionally, social networking structures may have existed had there been some sort of monetary incentive for completing the survey (such as a drawing for a free iPod). Of course, social networking can lead to bias. As alluded to in the future research section, brand identification is strong in the IT sector (Muniz, 2001). Brand identification is particularly strong in the FOSS community, though "brand" takes on a different meaning sometimes (Zhao, 1999).

In the end, the goal is to do what is best for the University. Financial considerations, such as TCO are certainly not the only considerations since the primary mission of the university is to educate, not to be profitable, but another look at TCO is

worthwhile. For those unfamiliar with TCO considerations, one can think of it as one step removed from the business tool Total Quality Management in its scope (Emerald Group Publishing Limited, 2005).

To evaluate TCO, one should keep logs of report calls to support vendors. If logs have previously been taken, as they should have been, one can compare the before and after call times as well as any additional charges from the vendor. In addition to support calls, the team should also log customer complaints. Initially, there will be more complaints if the new programs are end user programs and not server based IT programs. While these initial costs should certainly be factored in, their weight should be lessened when looking at long-term effects. Total organizational effectiveness should also be taken under consideration. If there has been a decrease in productivity, such as money raised, papers published, etc., IT staff should work with staff and faculty to determine whether the software is the cause of the issue.

Additionally, one should keep track as to if support costs are actually saving money versus buying the software, on a superficial level. For instance, if a license for proprietary software costs $25, but a support contract for FOSS costs $35 the University will have lost money on FOSS. Also, one needs to make sure hardware costs are actually decreasing. Even if using FOSS lowers minimum system requirements that does not mean departments will take advantage of this performance increase.

Speculation is that FOSS will increase productivity and save money in the long term (Groklaw, 2007). If done incrementally, the initial productivity and support costs will be lessened. While not discussed explicitly here, Freeware (software that does not cost, but is still proprietary) should also be considered by an organization in a budget

crisis. Freeware, however, does not give the added benefits of increased security, support competition, community support or the ability to modify the program to an individuals' needs that FOSS gives.

One of the specific reasons for this research was to look at how site-licensing and academic discounts affected the adoption of FOSS. As anticipated, while no questions asked specifically about site-licensing or academic discounts, many respondents mentioned them. In a non-survey response correspondence, an individual mentions that "perhaps he/she never considered a FOSS alternative" which is precisely the danger site-licensing increases. It can help perpetuate the myth that there are not alternatives to certain software packages, such as Windows or Adobe Photoshop. In fact, this respondent goes on to say that s/he does not know if there is a FOSS database package available; a scary thought given their adoption numbers. Site licensing does have benefits, since it can help distribute costs among child-organizations for volume discounts. Additionally, the site licensing model can be used for FOSS (or other) support contracts such as contracts with Red Hat (RHEL) or Canonical (Ubuntu) for Linux.

Site licensing has other potential issues aside from pushing users to proprietary software. One problem with site licensing is that organizations are depending on other organizations to have a similar mission. Recently the campus discontinued site licensing for Novell Netware. Organizations using alternatives were not adversely affected by this change and those using FOSS alternatives will never have to worry about other campus organizations changing their computing focus. By taking proactive steps away from site licensing and towards FOSS, one builds a culture around FOSS, and once there is a culture of FOSS many of the TCO issues associated with a move to FOSS no longer

exist. UNC's move away from Novell is promising, as it sets precedent for dropping site licensing, though the drop was likely caused by lack of use. Asking the question of use is great, but it does not go far enough. The real question that needs to be asked is if this software would be used if there was not a site license. For instance, an alternative to using a Windows install in a virtual machine on an Apple computer for use of a single program was proposed at my former employer on campus, University Advancement. The proposal was shot down as not needed since "we don't pay for Windows." This is a case of where Windows would not be used if we had to pay for Windows, but it was being used because of the site license.

While much of the debate of FOSS versus proprietary hinges on the Linux versus Windows debate there in no reason an otherwise FOSS environment cannot run on the Windows platform. Moving toward OpenOffice.org and other FOSS alternatives can build a FOSS culture on the Windows platform, making a potential later migration to Linux less of a problem. One of the problems with switching from Windows to Linux is that it forces other applications to also change. One of the non-survey respondents rightly questioned why an Internet Explorer versus Firefox question was on a survey about costs, since Internet Explorer comes with every Windows system and thus does not cost Windows users. However, the question existed to get a sense of how difficult a move to Linux would be and for general cultural FOSS relevance. Firefox is likely the most widely used FOSS program and the browser wars have a long history dating back to Firefox's previous life as Netscape Navigator (Mockus, 2002). Indeed, Internet Explorer (and some other programs, including MS Office) will not work on Linux. As many survey respondents reported, many users at the university cannot totally switch to Firefox

since web applications are frustratingly built only for Internet Explorer. Incrementally pushing for FOSS however, will decrease the chance of a support bottleneck at one time and lessen user frustration. If FOSS use is seen in other areas, perhaps web developers will understand that giving users a choice of browsers is a great thing, even if users choose a different proprietary browser on Windows. The longer one stays in the Microsoft paradigm, the harder it is to get out of that paradigm.

Appendix A: Original Survey for IT Managers

1. What division do you manage?
2. Do you consider this division to be IT intensive in general, when compared to other university departments?
3. What is total budget in dollars of the IT division you manage?
4. What is the software acquisition component in dollars of the budget of the IT division you manage (otherwise said, “how much do you spend on software”)?
5. To the best of your knowledge, how many different programs (not installation count) does the division use? For example Firefox and Internet Explorer (IE) would count as two pieces of software.
6. Of these programs, how many, to the best of your knowledge are FOSS and how many are proprietary?
7. What is the divisions' current most costly software license and what does it cost (both overall and per install)?
8. To the best of your knowledge, are there FOSS alternatives to the software from question 7?
9. Does the IT division you manage actively promote use of Firefox over Internet Explorer when possible?
10. Does the IT division you manage actively seek FOSS (Free and Open Source Software) when the need for additional software arises, whether that need be due to potential upgrades (Ex: MS Office 2003 migrating to MS Office 2007) or new needs (Ex: a statistical package is now needed)?
11. What is the primary reason this IT division seeks or does not seek FOSS?

Appendix B: Revised Survey for IT Staff

1) For what division do you work?

2) Do you consider this division to be IT intensive in general, when compared to other university departments?

3) What is total budget in dollars of the IT division for which you work?

4) What is the software acquisition component in dollars of the budget for IT division for which you work (otherwise said, "How much do you spend on software")?

5) To the best of your knowledge, how many different programs (not installation count) does the division use? For example Firefox and Internet Explorer (IE) would count as two pieces of software.

6) Of these programs, how many, to the best of your knowledge are FOSS (Free and Open Source Software) and how many are proprietary?

7) What is the divisions' current most costly software license and what does it cost (both overall and per install)?

8) To the best of your knowledge, are there FOSS alternatives to the software from question 7?

9) Does the IT division for which you work actively promote use of Firefox over Internet Explorer when possible?

10) Does the IT division for which you work actively seek FOSS when the need for additional software arises, whether that need be due to potential upgrades (Ex: MS Office 2003 migrating to MS Office 2007) or new needs (Ex: a statistical package is now needed)?

11) What is the primary reason this IT division seeks or does not seek FOSS?

Appendix C: Open Source Definition, by Open Source Initiative

1. Free Redistribution

The license shall not restrict any party from selling or giving away the software as a component of an aggregate software distribution containing programs from several different sources. The license shall not require a royalty or other fee for such sale.

2. Source Code

The program must include source code, and must allow distribution in source code as well as compiled form. Where some form of a product is not distributed with source code, there must be a well-publicized means of obtaining the source code for no more than a reasonable reproduction cost preferably, downloading via the Internet without charge. The source code must be the preferred form in which a programmer would modify the program. Deliberately obfuscated source code is not allowed. Intermediate forms such as the output of a preprocessor or translator are not allowed.

3. Derived Works

The license must allow modifications and derived works, and must allow them to be distributed under the same terms as the license of the original software.

4. Integrity of The Author's Source Code

The license may restrict source-code from being distributed in modified form *only* if the license allows the distribution of "patch files" with the source code for the purpose of modifying the program at build time. The license must explicitly permit distribution of software built from modified source code. The license may require derived works to carry a different name or version number from the original software.

5. No Discrimination Against Persons or Groups

The license must not discriminate against any person or group of persons.

6. No Discrimination Against Fields of Endeavor

The license must not restrict anyone from making use of the program in a specific field of endeavor. For example, it may not restrict the program from being used in a business, or from being used for genetic research.

7. Distribution of License

The rights attached to the program must apply to all to whom the program is redistributed without the need for execution of an additional license by those parties.

8. License Must Not Be Specific to a Product

The rights attached to the program must not depend on the program's being part of a

particular software distribution. If the program is extracted from that distribution and used or distributed within the terms of the program's license, all parties to whom the program is redistributed should have the same rights as those that are granted in conjunction with the original software distribution.

9. License Must Not Restrict Other Software

The license must not place restrictions on other software that is distributed along with the licensed software. For example, the license must not insist that all other programs distributed on the same medium must be open-source software.

10. License Must Be Technology-Neutral

No provision of the license may be predicated on any individual technology or style of interface.

Appendix D: Original Letter to IT Managers

Dear IT Managers:

IT organizations at large academic institutions are under interesting circumstances, with budgets determined in part by the political environment, site licensing and academic discounts. While Free and Open Source Software (FOSS) can offer benefits in scalability and against vendor lock-in, no one knows how much money is saved under these unusual circumstances. It is because of this unknown that I am researching this topic for my Master's Paper in the School of Information and Library Science. In this study, I am asking managers of technology entities on campus to fill out the questionnaire below. Please also feel free to have a representative return the survey on your behalf, but please only one survey per entity. Entities here can be any organization that falls under the umbrella of the University of North Carolina at Chapel Hill. A manager in this case need not be responsible for other individuals, if it is a one person department. The person in charge of funding, at some level, is the person who should fill out the questionnaire. Your participation in this study is completely voluntary.

To participate in the study you would complete the enclosed questionnaire and return it via e-mail to whitdoug@email.unc.edu. Returning your completed questionnaire connotes your consent to be a participant in this study. This questionnaire is composed of questions addressing software acquisition costs in your department. Completion of the questionnaire should take no longer than 10 minutes. You are free to answer or not answer any particular question and have no obligation to complete answering the questions once you begin.

Your participation is NOT anonymous, to ensure that you are, in fact, an IT Manager at UNC-CH. Individuals will not be identified in any reports or presentations, unless explicit consent is given to do so, though department names will. We plan on publishing the results of this research as well as communicating these results to the professional associations in information technology. The only persons who will have access to these data are the investigators named on this letter. There is no planned procedure for deletion or retention of e-mail, though you can request to have your e-mail deleted after the research is concluded. Please simply state your request for e-mail deletion via e-mail. If requested, you will be notified at studies' completion of e-mail deletion.

Because we want to encourage the participation of as many IT managers as possible, we will be sending you a reminder approximately 10 days after you receive this letter.

There are neither risks anticipated should you participate in this study nor any anticipated benefits from being involved with it. However, there will be professional benefit from this study, as the information we obtain will be communicated to the profession through publication in the literature, presentation at professional meetings and directly dissemination to the professional associations. There is no cost to you or financial benefit for your participation.

You may contact us with any questions at (919) 360-0306 or by email (preferred).

All research on human volunteers is reviewed by a committee that works to protect your rights and welfare. If you have questions or concerns about your rights as a research subject you may contact, anonymously if you wish, the Institutional Review Board at

919-966-3113 or by email to IRB_subjects@unc.edu. If you contact the IRB, please refer to study number 08-0213.

Thank you for considering participation in this study. We hope that we can share your views with the greater professional community and use your response to help shape recommendations for addressing FOSS in academic institutions.

Sincerely,

Doug Whitfield, MSIS Student
Paul Jones, Faculty Sponsor, pjones@metalab.unc.edu

Appendix E: Letter to IT Staff

Dear IT Staff:

Due to lack of response, I am changing my research to include any staff working in information technology at the University of North Carolina at Chapel Hill.

IT organizations at large academic institutions are under interesting circumstances, with budgets determined in part by the political environment, site licensing and academic discounts. While, Free and Open Source Software (FOSS) can offer benefits in scalability and against vendor lock-in, no one knows how much money is saved under these unusual circumstances. It is because of this unknown that I am researching this topic for my Master's Paper in the School of Information and Library Science. In this study, I am asking staff of technology entities on campus (including student employees) to fill out the questionnaire below. Please also feel free to have a representative return the survey on your behalf. Entities here can be any organization that falls under the umbrella of the University of North Carolina at Chapel Hill. Your participation in this study is completely voluntary.

To participate in the study you would complete the enclosed questionnaire and return it via e-mail to whitdoug@email.unc.edu. Returning your completed questionnaire connotes your consent to be a participant in this study. This questionnaire is composed of questions addressing software acquisition costs in your department. Completion of the questionnaire should take no longer than 10 minutes. You are free to answer or not answer any particular question and have no obligation to complete answering the questions once you begin. Please answer to the best of your ability and do not feel as though you can not respond if you do not know the answer to some of the questions.

Your participation is NOT anonymous, to ensure that you are, in fact, employed in IT at UNC-CH. Individuals will not be identified in any reports or presentations, unless explicit consent is given to do so, though department names will be reported. We plan on publishing the results of this research as well as communicating these results to the professional associations in information technology. The only persons who will have access to these data are the investigators named on this letter. There is no planned procedure for deletion or retention of e-mail, though you can request to have your e-mail deleted after the research is concluded. Please simply state your request for e-mail deletion via e-mail. If requested, you will be notified at studies' completion of e-mail deletion.

Because we want to encourage the participation of as many IT staff as possible, I will be sending you a reminder approximately 10 days after you receive this letter.

There are neither risks anticipated should you participate in this study nor any anticipated benefits from being involved with it. However, there will be professional benefit from this study, as the information we obtain will be communicated to the profession through publication in the literature, presentation at professional meetings and directly dissemination to the professional associations. There is no cost to you or financial benefit for your participation.

You may contact us with any questions at (919) 360-0306 or by email (preferred).

All research on human volunteers is reviewed by a committee that works to protect your rights and welfare. If you have questions or concerns about your rights as a

research subject you may contact, anonymously if you wish, the Institutional Review Board at 919-966-3113 or by email to IRB_subjects@unc.edu. If you contact the IRB, please refer to study number 08-0213.

Thank you for considering participation in this study. I hope that we can share your views with the greater professional community and use your response to help shape recommendations for addressing FOSS in academic institutions.

Sincerely,

Doug Whitfield, MSIS Student
Paul Jones, Faculty Sponsor, pjones@metalab.unc.edu

Appendix F: Response from Health Science Library

1. What division do you manage?

   Health Sciences Library – IT Services

2. Do you consider this division to be IT intensive in general, when compared to other university departments?

   Yes; HSL-ITS provides all hardware/software support for the library

3. What is total budget in dollars of the IT division you manage?

   Approximately $125,000.00 for FY07-08

4. What is the software acquisition component in dollars of the budget of the IT division you manage (otherwise said, "how much do you spend on software")?

   $15,000.00 - $20,000.00

5. To the best of your knowledge, how many different programs (not installation count) does the division use? For example Firefox and Internet Explorer (IE) would count as two pieces of software.

   40

6. Of these programs, how many, to the best of your knowledge are FOSS (Free and Open Source Software) and how many are proprietary?

   12 (FOSS)

7. What is the divisions' current most costly software license and what does it cost (both overall and per install)?

   Marathon EverRun (fault-tolerance/failover) – $7,500.00

8. To the best of your knowledge, are there FOSS alternatives to the software from question 7?

   No

9. Does the IT division you manage actively promote use of Firefox over Internet Explorer when possible?

   Yes

10. Does the IT division you manage actively seek FOSS when the need for additional software arises, whether that need be due to potential upgrades (Ex: MS Office 2003 migrating to MS Office 2007) or new needs (Ex: a statistical package is now needed)?

    Yes

11. What is the primary reason this IT division seeks or does not seek FOSS?

    Cost reduction

Appendix G: Response from School of Public Health: Biostatistics

1) What division do you manage? Department of Biostatistics
2) Do you consider this division to be IT intensive in general, when compared to other university departments? Yes
3) What is total budget in dollars of the IT division you manage? $200,000
4) What is the software acquisition component in dollars of the budget of the IT division you manage (otherwise said, "how much do you spend on software")? $20,000
5) To the best of your knowledge, how many different programs (not installation count) does the division use? For example Firefox and Internet Explorer (IE) would count as two pieces of software. 72
6) Of these programs, how many, to the best of your knowledge are FOSS (Free and Open Source Software) and how many are proprietary? 22 FOSS and 50 proprietary
7) What is the divisions' current most costly software license and what does it cost (both overall and per install)? Platform LSF - $24/per single CPU, if CPU is multi-core then add $12. Overall cost/year $1,684.00
8) To the best of your knowledge, are there FOSS alternatives to the software from question 7? Yes
9) Does the IT division you manage actively promote use of Firefox over Internet Explorer when possible? Yes
10) Does the IT division you manage actively seek FOSS when the need for additional software arises, whether that need be due to potential upgrades (Ex: MS Office 2003 migrating to MS Office 2007) or new needs (Ex: a statistical package is now needed)? Yes
11) What is the primary reason this IT division seeks or does not seek FOSS? Cost

Appendix H: Response from Micro Medic

1. For what division do you work? I am employed by **Micro Medic** and provide user support mainly in the Lineberger Comprehensive Cancer Center. I have been doing this for the past thirteen years.

2. Do you consider this division to be IT intensive in general, when compared to other university departments? No.

3. What is total budget in dollars of the IT division for which you work? The only part which is organized enough that it might have a unified budget is the administrative office of about fifty people, but, since I'm a contractor and not an employee, I don't know what the budget is.

4. What is the software acquisition component in dollars of the budget for IT division for which you work (otherwise said, "How much do you spend on software")?I don't know.

5. To the best of your knowledge, how many different programs (not installation count) does the division use? For example Firefox and Internet Explorer (IE) would count as two pieces of software. I have no idea. There are about five hundred people here in widely different jobs.

6. Of these programs, how many, to the best of your knowledge are FOSS (Free and Open Source Software) and how many are proprietary? I have no idea.

7. What is the divisions' current most costly software license and what does it cost (both overall and per install)? It is probably for Department Manager which is a product of IT Works in Raleigh. It is a MS Access-based database for managing personnel, accounting, grants, etc. It may be replaced by the UNC ERP initiative. It requires lots of maintenance and updates which I know are expensive.

8. To the best of your knowledge, are there FOSS alternatives to the software from question 7? No

9. Does the IT division for which you work actively promote use of Firefox over Internet Explorer when possible? That has been done. However, most UNC web apps such as WebCIS, Finance Central, and many others only work well, if at all, on IE6 and not even IE7. This means that ordinary users who just want to do their jobs end up frustrated and unproductive with Firefox.

10. Does the IT division for which you work actively seek FOSS when the need for additional software arises, whether that need be due to potential upgrades (Ex: MS Office 2003 migrating to MS Office 2007) or new needs (Ex: a statistical package is now needed)? Most of the software people use is UNC site licensed which means that there is never a charge for MS Office beyond its installation. I usually install 7-Zip and PDFCreator when setting up new PC's, but the user will complain and request WinZip

and Acrobat even though they will never do more with Acrobat than printing Word files to pdf's.

11. What is the primary reason this IT division seeks or does not seek FOSS? It's wasted effort if there is no support from UNC. In fact, in a few years there will probably be fewer people in the School of Medicine using Thunderbird. OIS is planning to replace its Sun email server with a MS Exchange server in order to have a single system for email, calendar, and messaging. The present system requires a Unix account for email and a Windows domain account for calendaring with no effective support in messaging. This has meant an excessive amount of time spent on coaxing users to do an better job after you finally get all their passwords reset and synchronized.

Appendix I: Response from College of Arts and Sciences: Department of Biology

1) For what division do you work?
   UNC-CH Dept. of Biology
2) Do you consider this division to be IT intensive in general, when compared to other university departments?
   Moderately
3) What is total budget in dollars of the IT division for which you work?
   I do not know.
4) What is the software acquisition component in dollars of the budget for IT division for which you work (otherwise said, "How much do you spend on software")?
   There is no central management of software purchasing. Most if it is through ITS software acquisitions… For IT use: ~ a few thousand a year.
5) To the best of your knowledge, how many different programs (not installation count) does the division use? For example Firefox and Internet Explorer (IE) would count as two pieces of software.
   At least about 200. No exact count…
6) Of these programs, how many, to the best of your knowledge are FOSS (Free and Open Source Software) and how many are proprietary?
   My estimation is that about 75% of them are proprietary.
7) What is the divisions' current most costly software license and what does it cost (both overall and per install)?
   Adobe products and server software.
8) To the best of your knowledge, are there FOSS alternatives to the software from question 7?
   Yes.
9) Does the IT division for which you work actively promote use of Firefox over Internet Explorer when possible?
   No.
10) Does the IT division for which you work actively seek FOSS when the need for additional software arises, whether that need be due to potential upgrades (Ex: MS Office 2003 migrating to MS Office 2007) or new needs (Ex: a statistical package is now needed)?
    No.
11) What is the primary reason this IT division seeks or does not seek FOSS?
    Higher man-hours and cost of maintenance. The purchase price of the software is usually not the higher cost component.

Appendix J:
Response from College of Arts and Sciences: Department of Marine Science

1) For what division do you work?

   College of Arts and Sciences; Department of Marine Science.

2) Do you consider this division to be IT intensive in general, when compared to other university departments?

   Yes. My department provides staff scientists to RENCI and is a major consumer of research computing resources.

3) What is total budget in dollars of the IT division for which you work?

   I don't work in an IT division. I have no idea what my department budget is. Department expenses are paid almost exclusively through federal grants running in the millions of dollars annually but are highly variable.

4) What is the software acquisition component in dollars of the budget for IT division for which you work (otherwise said, "How much do you spend on software")?

   We spend next to nothing on software acquisition. We use open source almost exclusively.

5) To the best of your knowledge, how many different programs (not installation count) does the division use? For example Firefox and Internet Explorer (IE) would count as two pieces of software.

   No idea. That would take quite a bit of time to compile. If you want to know that, you should come over and do that inventory yourself.

6) Of these programs, how many, to the best of your knowledge are FOSS (Free and Open Source Software) and how many are proprietary?

   About half and half.

7) What is the divisions' current most costly software license and what does it cost (both overall and per install)?

   No idea. There are a lot of Matlab licenses. There are a few ARC licenses. A lot of licensing is done through license servers operated by the university which share

licenses between current users, so users would never be aware of the cost.

8) To the best of your knowledge, are there FOSS alternatives to the software from question 7?

   Yes. SciPy and Matplotlib provide a complete replacement and compatibility layer for Matlab. And GRASS and other tools provide a complete replacement for ARC. The main engine for ARC is even a piece of FOSS software which is dual licensed to ESRI for commercial use.

9) Does the IT division for which you work actively promote use of Firefox over Internet Explorer when possible?

   No. There is no promotion work going on. People use what they feel comfortable with.

10) Does the IT division for which you work actively seek FOSS when the need for additional software arises, whether that need be due to potential upgrades (Ex: MS Office 2003 migrating to MS Office 2007) or new needs (Ex: a statistical package is now needed)?

    Sometimes. It depends on what individuals are comfortable with.

11) What is the primary reason this IT division seeks or does not seek FOSS?

    The main reasons we use FOSS are best of breed tools and methodology. Other reasons are cost and adaptability.

    The main reasons we do not use FOSS are working with others who don't and availability of pre-purchased university licenses for software with which personnel are already familiar.

Appendix K: Response from University Advancement

1) For what division do you work? University Advancement
2) Do you consider this division to be IT intensive in general, when compared to other university departments? Yes, we provide file, print, email, pda, and database services to our customers
3) What is total budget in dollars of the IT division for which you work? Sam R., should give me this total from last year by tomorrow sometime.
4) What is the software acquisition component in dollars of the budget for IT division for which you work (otherwise said, "How much do you spend on software")?counting the Network Operating systems liscenses and network backup liscensing maintaince and the Iron Mountain subscription, approx. $20,000
5) To the best of your knowledge, how many different programs (not installation count) does the division use? For example Firefox and Internet Explorer (IE) would count as two pieces of software. You can get that total from Patchlink.
6) Of these programs, how many, to the best of your knowledge are FOSS (Free and Open Source Software) and how many are proprietary? 1 - Firefox
7) What is the divisions' current most costly software license and what does it cost (both overall and per install)? Novell Network Operating System - $7,000
8) To the best of your knowledge, are there FOSS alternatives to the software from question 7? No
9) Does the IT division for which you work actively promote use of Firefox over Internet Explorer when possible? We give the customer a choice but if they are accessing UNC Systems then we let them know that IE is more compatible.
10) Does the IT division for which you work actively seek FOSS when the need for additional software arises, whether that need be due to potential upgrades (Ex: MS Office 2003 migrating to MS Office 2007) or new needs (Ex: a statistical package is now needed)? Yes we try to stay up to date on our knowledge of other free solutions and see if they will fully meet the need and be compatible with other campus systems.
11) What is the primary reason this IT division seeks or does not seek FOSS? We do seek FOSS solutions but due to compatibility and features requirements , we are unable to pursue many of them at this time.

Appendix L: Response from Information Technology Services: Telecommunications

1) What division do you manage?

ITS Telecommunications R&D. We are responsible for developing the next generation of communications system on campus, to support voice over IP, video, instant messaging, etc.

2) Do you consider this division to be IT intensive in general, when compared to other university departments?

Very.

3) What is total budget in dollars of the IT division you manage?

It varies by project. The total cost of the campus voice service is approximately $6million per year.

4) What is the software acquisition component in dollars of the budget of the IT division you manage (otherwise said, "how much do you spend on software")?

Almost $0. We use open source almost exclusively.

5) To the best of your knowledge, how many different programs (not installation count) does the division use? For example Firefox and Internet Explorer (IE) would count as two pieces of software.

I would say on the order of about 50.

6) Of these programs, how many, to the best of your knowledge are FOSS (Free and Open Source Software) and how many are proprietary?

99% We run Windows only to make sure our services work with the CCI load.

7) What is the divisions' current most costly software license and what does it cost (both overall and per install)?

$0

8) To the best of your knowledge, are there FOSS alternatives to the software from question 7?

NA

9) Does the IT division you manage actively promote use of Firefox over Internet Explorer when possible?

We don't use IE.

10) Does the IT division you manage actively seek FOSS when the need for additional software arises, whether that need be due to potential upgrades (Ex: MS Office 2003 migrating to MS Office 2007) or new needs (Ex: a statistical package is now needed)?

Yes.

11) What is the primary reason this IT division seeks or does not seek FOSS?

The number one reason we use FOSS is because it is the most standards compliant,

secure and resilient software we are able to find. Further, we are able to customize FOSS to our requirements and generally find that closed systems are not flexible enough in this regard. Cost of software and maintenance is not the issue.

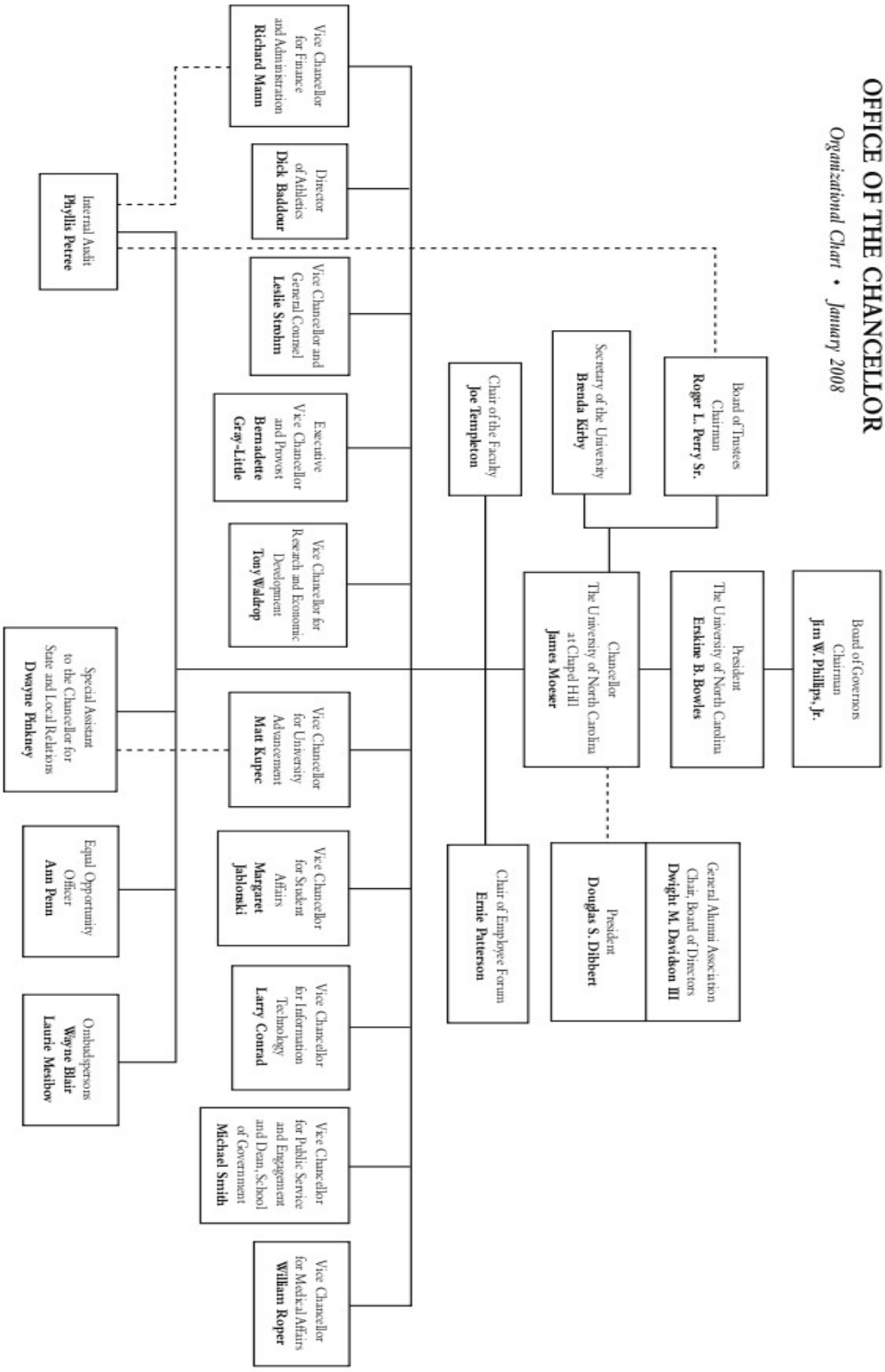
Appendix M: Response from Student Affairs Information Technology

1. What division do you manage? Student Affairs Information Technology
2. Do you consider this division to be IT intensive in general, when compared to other university departments? About equal to most, we have many web sites and quite a few database apps.
3. What is total budget in dollars of the IT division you manage? Ballpark - $600,000 - $700,000 but I don't have good exact numbers on that (our IT budgets are split up among departments)
4. What is the software acquisition component in dollars of the budget of the IT division you manage (otherwise said, "how much do you spend on software")? $20,000-$30,000 although significant software purchases can drive that up.
5. To the best of your knowledge, how many different programs (not installation count) does the division use? For example Firefox and Internet Explorer (IE) would count as two pieces of software. 30
6. Of these programs, how many, to the best of your knowledge are FOSS (Free and Open Source Software) and how many are proprietary? Many are web based applications, some can be accessed by any browser, others require IE. I would say about 2-3 of our apps are truly FOSSS
7. What is the divisions' current most costly software license and what does it cost (both overall and per install)? PyraMED in campus health, I don't have good numbers on cost at the moment
8. To the best of your knowledge, are there FOSS alternatives to the software from question 7? No, there are no FOSS clinic / ehr management solutions
9. Does the IT division you manage actively promote use of Firefox over Internet Explorer when possible? Yes, definitely. Although we have some web apps that require IE.
10. Does the IT division you manage actively seek FOSS when the need for additional software arises, whether that need be due to potential upgrades (Ex: MS Office 2003 migrating to MS Office 2007) or new needs (Ex: a statistical package is now needed)? Yes.
11. What is the primary reason this IT division seeks or does not seek FOSS? We leverage quite a bit of FOSS from PHP, and Java to Apache, Samba and MySQL. I believe that FOSS can fulfill many of our needs and provide a long-term sustainable solution for us.

Appendix N: Response from Frank Porter Graham Child Development Institute

1. For what division do you work? FPG Child Development Institute
2. Do you consider this division to be IT intensive in general, when compared to other university departments? Yes.
3. What is total budget in dollars of the IT division for which you work? ~$500K
4. What is the software acquisition component in dollars of the budget for IT division for which you work (otherwise said, "How much do you spend on software")? $5K
5. To the best of your knowledge, how many different programs (not installation count) does the division use? For example Firefox and Internet Explorer (IE) would count as two pieces of software. Server room: dozens to hundreds, 90% OSS. Clients: dozens, 20% OSS
6. Of these programs, how many, to the best of your knowledge are FOSS (Free and Open Source Software) and how many are proprietary? See number 5
7. What is the divisions' current most costly software license and what does it cost (both overall and per install)? Unknown – Teleform automated scanning software.
8. To the best of your knowledge, are there FOSS alternatives to the software from question 7? No.
9. Does the IT division for which you work actively promote use of Firefox over Internet Explorer when possible? Absolutely! Never use a browser that's integrated with your OS.
10. Does the IT division for which you work actively seek FOSS when the need for additional software arises, whether that need be due to potential upgrades (Ex: MS Office 2003 migrating to MS Office 2007) or new needs (Ex: a statistical package is now needed)? Server: Yes. Clients: somewhat.
11. What is the primary reason this IT division seeks or does not seek FOSS? Server side: actively seeking OSS due to superior support resources, reliability, flexibility, good adherence to standards, cost (least important reason!). Client side: Office locks us in. It's what they know and they will not accept a program that is not 100% compatible with Microsoft's formatting. Also, SAS is a requirement for our large Data Management/Statistics unit (30 people).

Appendix O: Office of the Chancellor Organizational Chart



Appendix P: FOSS Disclaimer

This document was produced using Linux, Inkscape, OpenOffice.org and Google Docs Spreadsheet. Research e-mails were sent using either Gmail or Thunderbird. Google Docs and Gmail are both proprietary software, but free for the public to use. All other software is FOSS.

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