THE POLITICS OF OPEN SOURCE ADOPTION

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TABLE OF CONTENTS

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Jennifer Urban, J.D. is Assistant Clinical Professor of Law USC School of Law and Director of the Intellectual Property Clinic, University of Southern California. The United States' transition from its traditional manufacturing base to a digital powerhouse has given rise to a rich information economy and a market for creative goods that is vastly different from previous markets. While consumers are now able to more closely interact with creative goods (such as movies, music, and e-books) than ever before, the same digital technology that allows myriad uses of creative goods can also "lock up" those goods or track consumers' habits at an intimate level. Such dramatic economic changes have radically altered the legal landscape as well, sparking intriguing questions of ownership, fair use, privacy and national security. As the director of the Intellectual Property Clinic--recently formed by the USC Law School, the USC Annenberg Center for Communication, and USC Information Services Division--Jennifer Urban is seeking answers to these issues and many more. The IP clinic participates in this process by enabling advanced law students to work on cutting-edge public interest issues in intellectual property and technology law. The clinic seeks to give them practical experience through projects such as helping "starving artists" register copyrights and working on open source licenses, as well as encourage the young lawyers how to think through the complex public policy questions surrounding intellectual property in the digital age.

INTRODUCTION

Joe Karaganis
Robert Latham

To date, research on the Free and/or Open Source Software (henceforth, F/OSS) movement has been oriented mostly by the improbable fact of F/OSS's existence. The development of complex software through highly distributed, mostly-volunteer collaboration ran against a number of standard economic expectations of how people behaved and how large-scale production could be organized. It demanded explanations: who contributes and why? What do contributors gain from it? Is the process sustainable? Is it translatable to other contexts? How does it relate to other forms of economic organization—notably the firm? Valuable work by Ghosh (1998), Raymond (1999), Lerner and Tirole (2000), Benkler (2002), Weber (2004), O'Mahony (forthcoming), and others have gone far in answering questions about the social and economic structure of F/OSS development—including central questions about F/OSS's incentives and forms of authority. A second corpus of research has been more practically oriented by the microeconomics of F/OSS adoption: where are F/OSS's comparative advantages over proprietary software? What are the business models that F/OSS can sustain (Perens 2004)? What are the decision points that lead institutions to adopt open source solutions (Dravis 2003)?

This project seeks to do something different. We propose that, at this stage of open source development and advocacy, we can begin to ask a different set of questions—not how open source works as a social and technical project, or whether open source provides benefits to a range of constituencies (in terms of cost, security, etc.), but rather how open source is becoming embedded in political arenas and policy debates. F/OSS adoption is increasingly a matter of politics and public policy—within public and private institutions, within municipalities and government agencies, and increasingly within political parties and national governments. It has become a subject of discussion within a wide range of international organizations, from the European Commission to UN agencies to forums like the World Summit on the Information Society. These conversations reflect the modest success of open source advocates in connecting F/OSS to a variety of broader political and social goods—economic development, the transparency of government functions, privacy of data, forms of local autonomy and agency, and of course, cost.

These encounters generate a wealth of political experience that is going mostly unrecorded, and with it a significant dimension of the history of F/OSS. Depending on one's perspective, this inattention is either a feature or a bug of the movement itself. Developers, advocates, and fellow travelers often prefer to focus on F/OSS's technical merits and on the force of its principles, while treating the politics of F/OSS adoption as a necessary evil of primarily tactical interest. F/OSS development and F/OSS adoption have been so rapid and have proliferated in so many different contexts that systematic accounts, much less comprehensive maps of the process, have been elusive.

But arguments do not make themselves and—as most participants in the F/OSS arena appreciate—software infrastructures are not simply the neutral outcomes of market choice. The success of open source reflects active practices of issue entrepreneurship and evangelization: at a basic level by building awareness of open source options, by broadening understanding of the ways in which software choice embeds social and political values, and by framing discussions of cost or security in ways that take account complex hypotheticals about the future. There is a thick social dimension to this process as F/OSS advocacy develops within commercial, technical, and NGO communities; as it succeeds or fails in building workable alliances; as it founders on or overcomes internal differences; and ultimately as it bridges out to other communities with less

stake in the technical values or development process of open source. It is our argument that the limits of open source adoption reflect, in part, a limited capacity to document, compare, and draw lessons from these processes.

Structure

For these reasons, we have tried to step back from the task of explaining or justifying F/OSS in order to ask how these increasingly canonical explanations and justifications are mobilized in different political contexts. We have solicited eight contributions from participants in and observers of F/OSS politics in different public institutions and political venues. In keeping with our notion of the utility of a 'map' of political processes, we have structured our account according to

Different venues and sites of adoption:

- The European Union and UN agencies at the international level;
- Kenya and Brazil at the national level;
- Extremadura, Spain and Munich, Germany at the local level;
- Civil society and health care sectors.

Challenges to F/OSS's viability and F/OSS community responses:

- Legal, here, issues of the ownership of code and the enforcement of licenses.

This is an avowedly partial account, intended to invite and provide a template for elaboration. We have tried to balance relatively schematic approaches to institutions and venues with detailed case studies of political processes and the actors involved in them. We have tried to organize the component accounts in a way that tells a coherent story about F/OSS politics, and that emphasizes the connections between different dimensions of political activity. This narrative follows a line through:

- **Rishab Aiyer Ghosh's** account of F/OSS's integration into European Union 'information society' and 'eInclusion' initiatives. The EU is home

to both the most extensive and best-organized networks of F/OSS advocates, and to the most developed and longrunning conversation about the evolving technological requirements of democracy and social inclusion. Ghosh concludes with a discussion of F/OSS adoption in Extremadura, Spain, where it serves as the basis of an economic development strategy.

- **Volker Grassmuck's** remarkable account of LiMux—the F/OSS migration project undertaken by the city of Munich. LiMux is arguably the highest profile case of municipal adoption in the world, and has served—often explicitly—as a template and resource for other municipal adopters. Grassmuck's contribution provides a detailed account of how F/OSS options were raised, explored, evaluated, and eventually selected; as well as how the transition was planned and, in its initial phase, implemented. At stake throughout is the unstable confluence of local party politics, technical and enduser concerns, the involvement of Microsoft, IBM, and other big corporate players, and the uncertainties generated by actual and potential legal challenges to F/OSS.

- **Kenneth Cukier's** account of the ways in which F/OSS has been taken up within International Governance Organizations (IGOs)—especially the World Intellectual Property Organization, UN development agencies, and the WSIS process. F/OSS advocacy in these settings is conditioned largely on the ability to introduce F/OSS into other institutional agendas, such as the longstanding 'Information and Communication Technology (ICT) for Development' initiatives within the UN system. Collectively, F/OSS politics at this level is structured by overlapping organizational mandates, widely varying degrees of openness to civil society, and more symbolic power than material resources for effecting change.

- **Bildad Kagai** and **Nicolas Kimolo's** account of efforts by FOSSFA (the Free and Open Source Foundation for Africa) to introduce F/OSS into Kenyan 'ICT for Development' policy. The piece explores the significance of F/OSS adoption in a context where IT infrastructure is weak and the where the state has been the primary ICT actor. Kagai and Kimolo describe both a goal and a process: (1) gaining official recognition of F/OSS as an option for ICT development policy; (2) improving the leverage of Kenyan F/OSS advocates within Kenya through participation in international discussions—notably WSIS.

- **Eugene Kim's** account of how F/OSS adoption became a national policy goal in Brazil, in large part through a deliberately-mobilized set of affinities between F/OSS principles and the nationalist, developmental, and democratic goals of the Workers' Party. Kim presents the complex incorporation of F/OSS into national party politics in Brazil, with the corresponding set of opportunities and risks. He also outlines Brazil's formulation of a more assertive, state-driven geopolitics of F/OSS, as it begins to offer an example of F/OSS adoption and ICT policy to other industrializing countries.

- **Gabriella Coleman's** account of F/OSS adoption in the civil society sector of, primarily, developing-world NGOs. Coleman focuses on the role that institutional mediators like Tactical Tech play in facilitating F/OSS adoption in the developing world and, especially, outside technically proficient, F/OSS-aware communities. The financial precariousness of many of these organizations and the thinness of F/OSS communities in many local settings shapes the case for—and define the points of resistance to—F/OSS adoption.

- **Jennifer Urban's** account of the uncertainty surrounding the ownership of F/OSS code and the enforcement of F/OSS licenses—as well as the nature of the F/OSS community's response. F/OSS's legal innovations have produced a number of largely untested assertions about end-user liability for copyright or patent infringement, and also a deliberate campaign on the part of competitors to make potential liability a decisive factor in F/OSS adoption. The F/OSS community has organized in novel ways to meet this challenge—in particular by leveraging the open, distributed capacities of the web as a tool of communication, publicity, and knowledge production.

- **Shay David's** account of the opportunities for F/OSS adoption in the health care sector, where non-interoperability, competition and vendor lock-in, privacy and liability concerns, the absence of public policy, and very limited F/OSS activism mark out a useful contrast to a discussion focused mostly on operating systems and the desktop. Health care is a field where a number of F/OSS projects are underway, but where the nature of F/OSS advantages are less clear and where the (political) conditions of widespread F/OSS adoption have not been met.

Conclusions

These eight contributions are by no means a comprehensive survey of the politics of F/OSS adoption. We offer them as the beginning of a process of documentation and analysis of a complex, fragmented world of activity. At one level, this information has a very practical dimension: it can help make F/OSS advocacy less ad hoc, less fragmented across different fields, ideologies and geographical boundaries, and more connected to broader concerns with the public domain and participatory democracy.

Ideally, it can reveal new open source constituencies in and outside the technical community and aid advocates in their work toward a more broadly participatory technological culture. This report is not a conclusion to a process but an invitation to the larger community involved in F/OSS adoption to reflect on, debate, and extend its findings. For this last purpose, especially, we have created a Wiki version of this document at www.ssrc.org/wiki/POSA . We would like to increase the number, range, and richness of the cases it includes, following the one analytical condition we have set ourselves: that this not an occasion to explain or justify F/OSS but to ask how explanations and justifications are mobilized in different political contexts.

Recognizing that more cases will provide a better basis for generalizations, we offer some provisional conclusions from our work:

- Open Source actors are becoming more adept at forum shopping—the pursuit of a policy goal in one venue to influence an outcome in another. Although the direct benefits of F/OSS advocacy in some forums are not always evident—the example of WSIS figures prominently here—advocacy efforts in official venues contribute to a larger arc of legitimation that feeds back into other adoption contexts. FOSSFA's use of WSIS to legitimize its status in Kenya's ICT debate, documented below, is an example. Because developing countries, especially, often look to the UN system for guidance on ICT policy, the effects of UNDP or UNECA endorsements can extend beyond the rather modest ICT programs of these organizations.

- Intermediaries are crucial. Technical staff needs to be involved at the outset of any F/OSS adoption or migration, but they are rarely sufficient to achieving it. This is not simply a matter of the lack of attentiveness, on the part of technically-adept F/OSS developers, to the needs of 'average' users. Successful F/OSS migration depends

heavily on the ability of intermediaries to (1) translate technical issues for wider constituencies, and (2) connect F/OSS's characteristics to other social and political values, including but not limited to cost. This mediation extends F/OSS coalitions outward, and also has an important feedback effect as non-technical constituencies begin to buttress (or require) technical staff support for F/OSS. This can be significant in organizations where technical staff is internally split about the costs and benefits of F/OSS adoption. Any number of actors can fill these roles, from charismatic and broad-minded software technicians to professional consultant/intermediaries, such as eRiders.

- F/OSS is likely to be explicitly integrated into party politics where the state plays a prominent role in technology-centered development. In such contexts, F/OSS offers a powerful and distinctive technology agenda that aligns most frequently with left-leaning critiques of globalization. Brazil is the most prominent example of this alignment—as well as of the party-identified internal opposition that it generates.

- F/OSS adoption requires a substantial private sector for software support and other technical services. Richer, better-organized migrations (e.g., LiMux) can contract multinational F/OSS providers such as IBM and Suse to manage the transition, and also undertake efforts to promote the growth of local support services. Poorer candidates, such as Kenya or the civil society sector described by Coleman, face a chicken-and-egg problem in which the service sector is often unable to provide the technical and human resources to support large-scale F/OSS adoption.

- Cost estimates are often unstable or incomparable across contexts. Because

4

the marginal cost of software production is near zero for both F/OSS and commercial software providers, commercial bidders have a significant capacity to match F/OSS's cost advantages in licensing. For large-scale software migration, F/OSS and commercial bids often end up on comparable terrain, dominated by the cost of services and by guesses about the future (e.g., about the behavior of commercial vendors and/or the development trajectory of F/OSS). Morevoer, the 'value' of major F/OSS characteristics, such as freedom from vendor lock-in or capacity to scrutinize the code, is not readily quantifiable. There are relatively few cases in which F/OSS adoption is unequivocally cheaper than proprietary software, and these are confined primarily to contexts of 'first deployment' of IT infrastructure, where transition costs (from, e.g., MS Windows) are low. Think Extremadura, not Munich. In decisions at the margin, social and political preferences can play a decisive role.

- Large institutional and municipal actors (e.g., Munich, Paris) are beginning to make strategic use of F/OSS as a bargaining chip in negotiations with commercial software vendors. Microsoft and, presumably, other large commercial vendors have dedicated resources to undercutting competitive bids from F/OSS providers, but there are clear limits to this strategy. Small actors will not be able to benefit from this form of market power, but they will benefit from the network effects that large scale F/OSS adoption generates.

- Clumsy intervention by Microsoft is the surest road to F/OSS adoption. A very short cognitive distance separates perceptions of Microsoft's aggressive dominance of its software markets from perceptions of a bullying, US-dominated model of globalization. Overt Microsoft involvement in local and/or national

politics—as in the cases of Brazil and Munich documented here—can rapidly close that distance and activate a much more explicitly political set of commitments to F/OSS, rooted in local or national desires for autonomy. Microsoft's characterizations of F/OSS as akin to communism or of software choice as best left to the unfettered market generally reinforce this process.

- There are many software markets in which Microsoft is a non-issue, such as in the healthcare sector. F/OSS politics operate differently in contexts where private monopoly power is not the primary foil. Moreover, F/OSS advocacy has a different opportunity structure when extensive government regulation is the norm, not the exception. In many of these settings, F/OSS must define its comparative advantages not against the proprietary software model per se, but against more powerful articulations of open standards, designed to promote interoperability. F/OSS advocates are generally geared for the battle over the desktop, but F/OSS presence in more specialized fields is often weak.

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THE EUROPEAN POLITICS OF F/OSS ADOPTION

Rishab Aiyer Ghosh

The success of F/OSS, both in terms of the commercial and technical strengths of the software produced, and as a model of organization and development, has made F/OSS a political issue of considerable importance in Europe. This politicization manifests itself in many areas, but is driven, as one might expect in countries dominated by the public sector, by the debate around government use of software. Free software has captured the collective imagination of European governments for at least two reasons: the software itself may be cheaper to use and support than proprietary software applications; and free software may be a novel, cost effective and highly responsive way to develop applications specific to government needs. This chapter will examine these and other reasons that frame the politics of free software in Europe, in order to build a "motivational map" within which the policies of individual European countries can be situated.

The chapter goes on to discuss different policies and actions in more detail, at the EU-wide, national and regional level. This is followed by a closer look at one of the best examples of politically charged implementation of free software as social and economic catalyst, the Spanish region of Extremadura, and concluding remarks on future directions.

The EU Political Framework: Why Free Software?

What is the content of the free software political discussion? In this contribution I do not take a normative approach, but consider the arguments that have actually been made and have gained currency in the EU. These fall broadly into two categories: overall societal benefit, and pragmatic. Of course, the "pragmatic" reasons such as lower prices also provide social benefits. The categorization is thus based on the framing of the debate and the associated degree of political idealism.

The overall societal benefit argument suggests that free software furthers transparency and democratic accountability; provides independence and localizes control and value flow; and furthers universal access goals including for people with disabilities.

"Pragmatic" arguments for free software include the potential lower cost; interoperability and the avoidance of "vendor lock-in", a common attribute of proprietary software; and better security. Clearly, the two categories are somewhat orthogonal, and the societal benefit arguments in particular build upon the pragmatic arguments.

Overall Societal Benefits

The arguments here often draw from the so-called Lisbon Agenda (and the eEurope Action plan), a major inter-governmental political agreement with the goal of making the EU "become the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion" by 2010. F/OSS can help to ensure that software production capability is being strengthened in Europe, thus providing employment in this growing economic sector. The texts quoted in the following sections are from unpublished EU documents that are by no means official policy, but indicate the sort of arguments being made at the political level.

Universal Access or "eInclusion"

Universal access, or access to information services and in particular government services for all citizens – including the economically disadvantaged and people with disabilities – is broadly referred to as "eInclusion". European arguments favoring free software in this regard follow these lines: "F/OSS affects social aspects of the European Union mainly through the requirement for the Information Society to be

all-inclusive. This also means that less privileged citizens or citizens with special needs (for example resulting from physical disabilities) have the right to equal access to the tools and information offered."

Independence, Local Control and Local Economic Growth

The capability to produce and control software is increasingly seen as a strategic societal asset. The nationalistic formulation of control represented by Microsoft's Jim Allchin has clearly resulted in an "equal and opposite" undercurrent in Europe in favor of free software: "I'm an American, I believe in the American Way. I worry if the government encourages free software, and I don't think we've done enough education of policy makers to understand the threat."

Free software is seen as locally produced, at least potentially. The ability to modify and redistribute software outside the control of any vendor is seen as important especially for government organizations. For instance, a survey of the Dutch public sector in 2003 found that 63.5% felt "too dependent on software vendors" and free software is seen as a way of reducing this dependence. This argument is developed further in the area of local economic development, as a government discussion document notes: "By vastly expanding the software production potential, by enabling the re-use of existing program code and by being able to bring together the joint efforts and expertise of a multitude of programmers and organizations it is much more likely that more customized ICT tools can be offered to more users at affordable costs." Similarly, in terms of regional development, where Extremadura is often provided as an example: "F/OSS offers the prospect for many regions to accelerate their participation in the global or European-wide information society via an incremental and collaborative approach. Open source software systems developed in more advanced regions can be deployed in other regions…"

Transparency and Democratic Accountability

Public sector organizations are obliged to provide transparency. Within a democratic state the citizen has a right of information, which remains strong within the European political debate. A common argument favoring free software is that this right does not only include the right for information, but also the right to know how this information is processed. Software is information interpretable by machines to execute determined tasks and commands. It is the legitimate right of the citizen to have the possibility to scrutinize these procedures. To quote an internal government document, "the requirement of transparency of government includes the right to verify how the public data are stored and handled and in some cases it may be essential to have the possibility of scrutinizing the source of the software used for the data processing (for example in e-voting software)."

Pragmatic Arguments

The pragmatic arguments used within European political structures are similar to those used elsewhere, though there are some emphases particular to the European policy framework.

Interoperability, Proprietary Standards and Vendor Lock-in

Interoperability, or rather the lack of it, has been blamed for the process of "vendor lock-in": the ability of proprietary software vendors to use their de facto standards for protocols and data formats to perpetuate their own software products in volume and over time. In order to retain compatibility with other organizations, consumers are forced to adopt software products that are most compatible with de facto proprietary standards – by definition, the product of a single proprietary vendor. Worse, in order to retain compatibility with previously purchased software, competition for the supply of new software is limited or non-existent as the single vendor of the previously purchased software is the producer, by definition, of the products "most compatible" with its own

proprietary standards. This results in situations where, for example, the Macedonian government reportedly justified its agreement to use Microsoft products without a competitive tender by "a clause in the anti-monopoly law which allows exclusivity because Microsoft is the only producer in the world creating the technology used by the Government" – not a difficult clause to use, when the technology is limited to the proprietary Microsoft products being used.

Since the standards of proprietary software are normally not open, it is hard for competitors – be they for profit or non-profit, proprietary or free software – to ensure that their software is able to process data produced by proprietary software (e.g. graphs or tables in word processors). By their dominant market position, proprietary software vendors can thereby enforce a kind of de facto standard, e.g. on office software, which then enhances the vendors' market position. This is of course a self-reinforcing process.

The use of proprietary standards is seen to lead to too much dependence on software vendors (reported by 67% of Dutch government authorities in 2003) . The result of such vendor lock-in is not only that the government itself loses control to software vendors – being subjected, for instance, to forced software and hardware upgrades – but that citizens may also be forced to buy from the same software vendors in order to interact with the government. Consequently one major argument expressed in the European political domain against the implementation of proprietary software in the public sector is the subsequent dependency on proprietary software vendors. Even in supposedly open procurement, the implicit or explicit requirement for compatibility with proprietary standards makes the system biased towards specific software vendors, perpetuating an anti-competitive dependency for the public sector and citizens.

Security

An anti-competitive dependency on software that is controlled by proprietary vendors is

inherently harmful for security. German Federal Interior Minister Otto Schily said in 2003, announcing Germany's decision to start using GNU/Linux, that using it would save the government money and improve the security of computer systems used by federal and local governments. "We are raising computer security by avoiding a monoculture, and we are lowering dependence on single suppliers," Schily said.

A number of well-publicized reports have suggested that free software may be inherently more secure than proprietary software. While this is debatable, the main free software operating packages (Apache, the Linux kernel) appear to be more secure and less prone to viruses and vulnerabilities than equivalent proprietary software products. Governments have also realized that proprietary software vendors explicitly disclaim liability for any problems with their software in their end-user license agreements (EULAs), which eliminates the "who can I sue?" argument against free software.

Security concerns have been heightened by an undercurrent of nationalistic suspicion – most major proprietary products are American, and while rumors of deliberate "backdoors" being placed by US intelligence agencies in, say, Microsoft Windows have not been backed up by any concrete evidence, proprietary software vendors find it difficult to disprove them. In order to gain some of the advantages of free software's transparency, Microsoft's Shared Source initiative provides certain customers, especially governments, limited access to inspect the source code of Microsoft products.

Cost

Cost has certainly played an important role in the political support for free software in Europe, especially at the level of local government. Despite the possibly high costs of migration (which would also arise during migration to other proprietary technology) there is recognition that free software reduces costs over the medium-to-long term. Furthermore, costs of service, support, and maintenance can be contracted out to a range of suppliers, being

placed in the competitive environment of a functioning market rather than subject to licenses and controls of particular vendors. Compared with proprietary software, a higher share of the total costs of free software usage are service costs (due to the lower licensing cost), and service costs are often more easily absorbed within government organizations and local economies. The Audit Office of the German state of Bavaria, the "Bayerischer Oberster Rechnungshof" emphasized this cost perspective as long ago as 2001.

A number of European public authorities have used the lower cost of free software simply as a bargaining tool for negotiating lower prices from Microsoft. The best example of this is the city of Munich, where, famously, Microsoft CEO visited the mayor with a special price. Despite the fact that the Microsoft price was reportedly significantly lower than the cost of migrating to free software, the city council finally decided in favour of migration, arguing that the long-term costs of vendor-dependency would more than offset the short-term discounts.

Policy and Practice in EU Member States

The previous section has identified the framework in which motives for free software are voiced in political debate in Europe. This section briefly identifies the impact of these motives in terms of concrete implementations and policies in EU member states, concluding with an example of society-wide adoption of free software with the highest level of political support, in the Spanish region of Extremadura.

EU-level Policy and Actions

Free software has gained currency in policy debate within the European institutions, specifically the European Commission. EC policy has been determined largely by the overall societal arguments, closely linked to the pragmatic one of interoperability. As described in the previous section, EC policy makers have identified free software as a possible way to improve access to government services to all citizens ("eInclusion & eAccessibility"). The

interoperability issue is closely linked to fairness and transparency in public procurement and the perceived failure of the software market, with the EC's anti-trust actions against Microsoft looming large in the background.

The EC itself is not a big user of free software in terms of internal use; while pushing open standards, it has found it difficult to ensure their use in practice even for documents published on EC websites. But the EC recognizes the public sector role in providing a "launching customer" providing the initial critical mass for the take off of free software products and services. Several EC programs, especially in research funding, include support for research and development that results in free software. The EC has financially supported a number of projects studying free software (socio-economics, in particular) as well as actual software development projects: Agnula, a free software music tools suite, and EUPKI, a public-key infrastructure system, are two examples.

The Interchange of Data between Administrations (IDA) Unit even hosts an Open Source Observatory, a central clearinghouse of news, case studies and other resources for free software in the public sector and recently published an European Interoperability Framework with a fairly strict definition of open standards.

Germany and France

Germany has long been the biggest promoter of free software in Europe, and arguably one of the biggest in the world. Several surveys have shown that Germany has a large share of the world's free software developers (with the EU collectively having a larger share than North America). There is a correlation, if perhaps no causal relationship, with the public support towards free software from various German government authorities. For instance, the city of Berlin has supported BerliOS since 1999. BerliOS was one of the first project portals for developers, similar to the US-based Sourceforge.net and has expanded to become a general support site for free software communities and businesses.

The German Bundestag (Parliament), supported by the BundesTux campaign started using free software in 2002. The Ministry of the Interior, quite apart from Minister Otto Schily's public statements supporting free software, has funded free software projects for a number of years, especially in the area of network security. The Ministry has also published guidelines for migration to free software as a reference for public administrations. Several local authorities have implemented free software, often, as with the example of Munich, after decisions made by politicians in local councils.

France has an active free software developer community and has also supported free software – *logiciel libre* – for several years at the political level. The Prime Minister's IT agency in 2003 released a guide on free software licenses for the public sector. In particular, it provided templates for framing public tenders giving preferential treatment to free software without violating anti-competitive rules for public procurement. Several French regions and local governments have been migrating to free software recently. The ministry of the Interior, customs, police and other agencies have announced cumulative migrations to OpenOffice numbering over 100 000 desktops in recent months . Earlier this year, even the city of Paris conducted a study on the feasibility of migrating to free software, and agreed that it would be worth considering gradually over a period of a few years .

Other Countries

Almost every EU member state has announced a policy relating to free software or implemented free software in national or local government. In the Netherlands, a motion asking the government to use only open standards and prefer free software wherever possible was carried unanimously by Parliament in 2002 and resulted in the government's OSOSS (Open Standards & Open Source Software) program. The UK and Sweden are among those with official policies to provide a "level playing field" to free software and consider it during public procurement; Belgium's legislatures have attempted to mandate its use. Italy has a national policy since December 2003 requiring that

public procurement tenders be written to allow solutions based on free software, and some regions such as Tuscany mandate the use of free software where possible. Lithuania has a national free software policy, and Hungary is implementing free software in small villages. Other examples and more details are available from the EU's Open Source Observatory and the presentations from the November 18 FLOSSPOLS conference.

One of the countries where support for free software has been strongest, and also the most politicized, is Spain. The success of policies in Extremadura led to projects in other regions, initially those run by left-of-center political parties but eventually free software has received support across political boundaries – in Andalucia, Valencia and Catalonia among other regions.

The Extremadura Case

Extremadura, lying along Spain's western border with Portugal, is the country's poorest region and one of the poorest in Western Europe. It is largely agricultural with low population density and limited transport infrastructure. In 1999, when the EU liberalized telecoms infrastructure, the region feared that it would miss out on the information revolution just as it had missed out on industry – privatized, profit-driven firms wouldn't bother to build infrastructure to keep Extremadura's rural population on the right side of the Digital Divide.

The region decided to "leapfrog" into the information society, and a decision was made at the highest level of government – by the regional president, Juan Carlos Rodriguez Ibarra – that the region would adopt the goal of universal access and participation in the information society. A decision in support of free software was made quickly – as a senior official in the Junta told me, "We could use proprietary software to provide access to all government officials, even all doctors and lawyers, but to provide access to all citizens – to everyone – we had to use free software." While this decision was made initially on the basis of its low cost, the other advantages of free software –

11

its freedoms – became apparent and the region's support for free software is now expressed mainly in political and ideological terms of freedom and independence.

With European regional development funds, Extremadura implemented its vision of universal participation: a public Internet access point and public library in every village; a computer for every two high school students; free "digital literacy" training for those who might otherwise never see a computer, retired persons, the unemployed, housewives . The Junta supported the creation of a version of the GNU/Linux operating environment, called GNU/LinEx (for Linux Extremadura) that was not only adapted to the local language – Spanish Linux versions already existed – but to the local culture. So, clicking an icon with the face of Zurbarán, a famous regional painter, is what launches the image manipulation application. The GIMP – the application's real name – or Photoshop, for that matter, are much less obvious for those who use GNU/LinEx. Such extensive localization means that people without previous computer experience learn to use LinEx quickly.

Free software applications including GNU/LinEx have been adopted on a huge scale by the entire public sector. Over 70,000 desktops in public administration use it, as well as over 80,000 desktops in schools. Extremadura became the EU's first region to reach a universal penetration of a computer for every two school students, not because other regions don't have the money, but because Extremadura's political vision of universal access drove it to do so, on the back of free software that dramatically lowered costs. The Junta estimates having spent Euro 300,000 on GNU/LinEx, mainly for marketing (printing manuals, distributing CDs), and saved Euro 1,000 per desktop, or several million Euro. The huge cost saving are of course much more than is saved simply by eliminating basic software such as Microsoft Windows or Office. For example, in a school I visited in Merida, the region's ancient Roman-era capital, the teacher was able, from her own desktop, to inspect, zoom in on and control the screens of the dozen-odd computers in the classroom. Such relatively sophisticated technology is rather expensive in its proprietary form, available from specialized classroom software vendors, and Extremadura's purely free software version put together from standard tools that have long been available to the global free software community saves a lot of money.

The region does not limit its support of free software to the public sector. According to the region's LinEx promoters, the aim is to have the entire society using free software. Thus, the "digital literacy" program which has trained over 80,000 people to use computers for the first time, through training centers spread around the region each staffed with a technical expert as well as a social worker. The Junta also has a business incubator to support ICT start-ups (preferably, though not exclusively, those using free software), spawning local free software businesses growing rapidly with customers in the rest of Spain and as far as Latin America.

This economically disadvantaged region has become recognized as one of the most innovative in Europe, leading in many ICT indicators, in just over four years. Fittingly, it was awarded the European Union's Regional Innovation Award for Information Society in April 2004.

Conclusion

This chapter has shown that the level of political awareness and politicization of free software is rather high in the European Union. While the motivations for supporting free software are not very different from elsewhere in the world, in Europe they are often framed within a context of societal benefit derived from longstanding arguments about the information society and the relationship between public and private provisioning. Many European countries and indeed transnational European Union institutions such as the European Commission, while not as overtly enthusiastic about free software as some developing countries especially in Asia, are clearly not hesitant in their support of free software. At the very least, European countries support open standards and encourage the consideration of free software for public procurement. Often, they have national policies and information campaigns actively encouraging

the take-up of free software, especially in regional authorities and in activities that interface directly with citizens. Finally, a few – increasing – examples like Extremadura show how free software has the potential to truly change the economic and political structure of a region's society itself.

LIMUX—FREE SOFTWARE FOR MUNICH

Volker Grassmuck[1]

Free software on the server end of an IT infrastructure is quite common in Germany.[2] What makes the LiMux project stand out is that the Bavarian capital Munich (1.3 million inhabitants) will migrate 14,000 PCs and laptops of its public employees to non-proprietary software. While this is not an economically large or particularly technically complex undertaking, it is the largest deployment of GNU/Linux and OpenOffice in the public sector so far, and this symbolic value turned it into one of the world's highest profile migration projects. Like the fall of the Berlin Wall, LiMux signals to public and private decision makers around the world that life beyond the existing order is possible.

The external driving force behind the City Council's migration decision was—Microsoft. By discontinuing support for its operating system, Windows NT, Microsoft forced Munich's IT administration to plan a major overhaul of its operating software base. Without further official support, Munich's workstations would quickly become obsolete, unable to reliably run new hardware, new software, or simply new versions of existing software. The municipality had no choice but to migrate to an OS with continuing support. WindowsXP, Microsoft's successor to NT, was a leading candidate. By changing its licensing policy for XP from a sales to a lease model, however, the company raised the concerns of budget managers about the rising total cost of ownership (TCO) of the software. A third and ultimately very important factor, identified by Munich's CIO, Wilhelm Hoegner, was that WindowsXP and its components regularly call home. It is unclear what kinds of data are transferred to Microsoft during these contacts, but Hoegner argued that the strict privacy obligations of the public administration made such uncertainty unacceptable).[3]

Within the municipal administration, the driving force behind LiMux is Wilhelm Hoegner, Head of AfID (Amt für Informations- und Datenverarbeitung / Department for Information and Data Processing), the central IT service provider for the City of Munich. Hoegner, 53, is a member of the Social-Democratic Party (SPD), an electrical engineer by training, and by no means an anti-Microsoft crusader—despite press depictions of him as a rebel and "a punk in a suit." In fact, he has worked with the company and its products for years, and has been just as critical of free

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[1] The author owes thanks to many people of which Florian Schießl and Jens Muehlhaus have to be mentioned, as well as the editors Joe Karaganis and Robert Latham for (nearly) unending patience.

[2] 20 % of companies in Germany (50% of large companies with more than 1000 staff) use GNU/Linux, another 5% use other free software. According to a study by market researcher Meta Group based on a survey of 354 companies with 50 or more staff, free software is still mostly used on servers but is on the rise on the desktop. Early adopters are infrastructure providers: telecoms, transport companies, retail and public administration. (Meta Group press release, Aktuelle Studie der META Group zum Einsatz von Open Source Software in deutschen Unternehmen 2004, 21.10.2004, http://www.metagroup.de/presse/2004/pm34_21-10-2004.htm)

[3] Der Linux-Entscheider Münchens. Punk im Anzug, Sueddeutsche Zeitung, 19 November 2004, http://www.sueddeutsche.de/kultur/artikel/341/43298/

software. His first proposal for F/OSS migration to the Munich City Council in February 2002 met with unanimous rejection. Politicians from all the parties resisted the idea of a switch from a time-tested office suite to new software.

Were they right? Is free software only suitable for server-side functions operated by IT professionals—in Munich's case, dating back to 1995—or could end-users also learn to work with it? In 2002, Hoegner decided to test his concerns on a randomly selected user group— his wife, Dagmar. When Dagmar quickly developed competency with OpenOffice, "a new, Microsoft-free world took shape for the first time" in Hoegner's mind.[4] With Hoegner's unambivalent support, a strong alliance between the technical and the political leadership of Munich City began to grow.

The process preceding the migration had three phases. In November 2001, the City Council decided to evaluate the available alternatives in operating systems (OS) and office suites. In April 2002, it commissioned a consulting company to conduct a study of various possible client configurations.

Based on the results of this first phase, the City Council decided in May 2003 to move its IT systems to free software and web-based applications. The critical arguments for free software were greater vendor independence, leading to more competition in the software market; the future-proofness of open protocols, interfaces, and data formats; and improved security through greater transparency. For users, the greater stability of their workspace computers is expected to be the biggest advantage. Microsoft responded by offering large price reductions on Windows XP and Office, but the long-term advantages of vendor independence weighed more heavily than short-term savings. The Council then commissioned the development of a detailed plan for the migration, which was conducted by AfID together with IBM and SuSE/Novell.

In June 2004, the Council gave its final go-ahead and the third phase, the migration, began. "The migration decision of the municipality of the German city, Munich, is a clear political statement."[5] In spite of their decisiveness, city officials are cautious about predicting success, and chose to conduct a "soft" migration over a period of five years. Throughout, they were conscious of the challenges and costs of retraining—a problem avoided when a user community jumps from minimal IT infrastructure to widespread GNU/Linux adoption (as in the Extremadura case documented by Rishab Aiyer Ghosh in this report.)

A software transition of this scale was unprecedented in the European public sector, and has been widely covered by the press. According to many observers, the conversion of Germany's third largest city government to free software for the desktop is likely to have a network effect and to lead to a wave of other conversions in Germany's public sector as well as in other municipal governments across Europe. Many user communities feel the same pressure from Microsoft's abandonment of NT support and changing licensing policy, the same desire to escape the thumb-screws of increasing costs, the same sense of dependency on MS file formats, and worries about security.

Given the symbolic importance of the Munich case, heavyweights like Microsoft and IBM entered municipal politics, vying for votes on the council. As the Munich experiment attracted wider attention, it became a test case in the global politics of free software.

Background: The Growing Acceptance of Free Software

The City Council of Munich had long been a social-democratic oasis in the right-wing state of Bavaria. Currently governed by a red-green coalition, it tends to echo the generally strong support for free software found on the federal level. Federal support for F/OSS goes back

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[4] Ibid.

[5] LiMux – the IT-Evolution, p. 6, http://europa.eu.int/ida/servlets/Doc?id=17200

several years. The 2002 decision to migrate the servers of the Bundestag (the First Chamber of the German Federal Parliament) to GNU/Linux drew significant attention, as has the migration of the Federal Ministries of the Interior, Economics, and Consumer Affairs. These leading adopters have paved the way for a wide range of other migrations of public offices, municipalities and private companies.

Among these public agencies, the Federal Bureau for Finances (Bundesamt für Finanzen -- BfF) runs all its Internet and intranet applications on Linux. The Anti-Trust Office, the Monopoly Commission, the Federal Bureau for Privacy Protection and others have partly or wholly switched to Linux and other free software. The Surveyor's Office of the State of Bavaria announced in June 2003 that all of its 79 departments, including its 3,000 desktops, are running Linux exclusively. The reasons cited include cost but also security.[6]

Other German cities have been exploring the same path Munich is taking. Indeed, the small town of Schwäbisch Hall in Baden-Würtemberg (36,000 citizens) can rightfully claim to have been first. It began to migrate its servers in August 2002, and in November 2004 announced that it would include all of its 400 desktop PCs as well. This decision led to requests from more than 30 municipalities in Germany and from others as far the US and Chile. Such actions tap extensive and often unanticipated anti-Microsoft sentiment.[7]

In addition to the technology departments of government agencies, it is often the financial departments that urge migration to free software. The Budget Audit Office of the German state of Bavaria (Bayerischer Oberster Rechnungshof) recommends free software for cost reasons wherever possible. Its Annual Report for 2001 devotes a whole chapter to criticizing the growing dependence on Microsoft products resulting from its new licensing practices, and also provides guidance on opportunities for using free software in the public administration. The document cites numerous examples of public offices that are already utilizing free software (e.g. the State Bureau of Criminal Investigation, the Surveyor's Office, and the Building Surveyor's Office), and describe how these migrations save millions of German Marks. It strongly recommended F/OSS on servers, and pilot projects for F/OSS on the desktop. It argued that more attention should be paid to F/OSS in schools.[8] In its 2004 Report, the Audit Office again urged that F/OSS be examined for the IT infrastructure needs of schools.[9]

These official recommendations began to bear fruit. Following the 2001 report, the State Parliament of Bavaria decided to include consideration of F/OSS solutions when choosing IT systems for the public administration.[10] In June 2002, the Federal Interior Ministry announced a cooperation agreement with IBM regarding the introduction of free software into public administrative offices—including special prices for hardware and software purchases. Half a year later, some 500 public offices on the municipal, state and federal level had made use of that agreement, and many more were standing in line.[11]

A month later, the Coordination and Consultation Bureau for IT in the Federal

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[6]For a selection of free software projects in the federal administration see http://www.kbst.bund.de/OSS-Kompetenzzentrum/-,276/Open-Source-Projekte.htm

[7]Schwäbisch Hall erregt mit Umrüstung auf Linux weltweites Interesse, Heise News, 26.02.2003, http://www.heise.de/newsticker/meldung/34859

[8]Bayerischer Oberster Rechnungshof, Jahresbericht 2001, esp. chapter 20, http://www.orh.bayern.de/Jahresbericht2001.pdf

[9]p. 88, http://www.orh.bayern.de/Jahresbericht2004.pdf

[10]LT-Drucksache 14/9009 Nr. 2 Buchstabe d, 19 March 2002

[11]Hintergrund: Das Kooperationsabkommen zwischen dem BMI und IBM, 5. Dezember 2002, http://www.kbst.bund.de/Software/-,72/IBM-Kooperation.htm#Abschnitt_Hintergrund

Administration (KBSt) of the Interior Ministry released a "Migration Guide" for both servers and desktops, gathering experiences from existing migration projects and giving detailed advice for decision makers in public administrations.[12] These reports and aggregated case studies have gone far in normalizing the adoption of F/OSS solutions in Germany, building outward from innovative public administrations toward other public and private constituencies.

Munich's Starting Position

In Munich, some 16,000 public servants make use of 14,000 PCs and Laptops. In 2004, all were running Windows NT 4.0 and Microsoft Office 97/2000. Roughly 300 other standardized software products are also in use, including web-browsers, schedulers, and clients for Siemens BS2000 and Novell. In addition, about 170 specialized applications are used, i.e. software either specially written or customized for the needs of the municipal administration. Some of these are large scale systems, such as those used by the motor-vehicle registration office. About half of these are macros, forms, and other add-ons linked to MS Office applications. The development of such systems is usually contracted to local small- and mid-sized enterprises (SMEs). Finally there are central server-based applications like databases (Oracle under Unix & Adabas/Natural under BS2000), file services (Novell Netware & Sun PC-Netlink), e-mail (Critical Path), calendar (Oracle), fax (Top-Call) and X.500 directory services (Critical Path).

Plans for the migration were simplified by that fact that MS backoffice components are not used in Munich, but complicated by the desire to continue using a number of specialized applications currently running on the Siemens BS2000 mainframes. Specialized hardware, like plotters and I/O devices, also added complexity to the migration.

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[12]The Guide is also available in English: KBSt/BMI, Migration Guide, http://www.kbst.bund.de/Anlage304428/Migration_Guide.pdf

Overall, the municipality has 17 IT administration centers, with independent data processing and different requirements for operation, user administration and support. The Department for Information and Data Processing (AfID) itself has five departments with 237 employees, and operates two of the computing centers. Procurement and strategy is arranged centrally, but operation and planning is done locally. Software allocation, security management and user help desks are not standardized. The migration is seen as a chance to consolidate these services.

Framing this agenda was a simple financial reality: the City of Munich, like most German municipalities, had no dedicated financial resources for the migration. It would all have to be done within existing operating budgets.

First Phase: Evaluating the Alternatives

On November 14, 2001, the Munich City Council decided to evaluate operating system and office suite alternatives. On April 17, 2002, it commissioned a study (by Unilog Integrata Consulting GmbH, with the support of AfID) of the possible configurations of the client systems for municipal desktops, which the consulting agency conducted from August to December 2002 (with an addendum in July 2003). The aims of the study were, first, to determine the current state of Munich's IT infrastructure (with the help of a questionnaire), and second, to evaluate possible alternative configurations on the grounds of technical feasibility, cost effectiveness and a number of qualitative and strategic criteria related to the city's understanding of its long term infrastructure needs. The alternatives were:

1. MS XP + MS Office XP
2. MS XP + OpenOffice
3. GNU/Linux + OpenOffice

And two transitional solutions:
3a. GNU/Linux + OpenOffice + PC Emulation (WINE / VMWare)
3b. GNU/Linux + OpenOffice + Terminal Server

Both transitional solutions presented architectural and operational complexities, not least with respect to security and an increased need for training. They were therefore considered undesirable as such and only to be deployed where no other solution could be found.

Although the widespread use of specialized applications presented a potential challenge, these were already scheduled for replacement by 2007, independent of the migration. Unilog therefore assumed that both standard and specialized applications, in the course of the usual "change of generation," could be replaced without additional effort. Staying within the Microsoft world would mean that some of this software could continue to be used but, even in that case, updating from Office97 to OfficeXP would, by Unilog's estimate, require the adaptation or re-writing of about 20% of existing macros, forms, and other specialized tools.

Finally, Unilog assumed that both XP and Linux would need PCs with a minimum processor speed of 500 MHz and main memory of at least 256 MB, meaning that half of the PCs currently in use would have to be replaced regardless of the choice. For peripheral hardware like printers, scanners, and devices for disabled persons, it was expected that in more cases drivers would be available for XP than for Linux.

Unilog calculated the total cost of migration, including initial and operational costs during the first four years, for the five alternatives:

1. MS XP + MS Office XP
   (34.18 million €)
2. MS XP + OpenOffice
   (39.75 million €)
3. GNU/Linux + OpenOffice
   (45.77 million €)
3a. GNU/Linux + OpenOffice + PC Emulation
   (35.94 millin €)
3b. GNU/Linux + OpenOffice
   (50.00 million €)

One of the largest factors in the XP/XP solution is the licensing cost of € 7.65 million until 2007. A small fraction of this sum is for the initial investment; the bulk represents the continuing costs of the Enterprise Agreement. In any of the scenarios, training makes up more than half of the total costs. All-MS solutions fared best in this category, leading Unilog to the conclusion that—on a cost basis alone—XP/XP offered a slight advantage.

But the City Council also asked Unilog to consider strategic and qualitative criteria in its recommendations that could not be easily expressed in monetary terms. These criteria included the effort required to fulfill the legal requirements associated with software infrastructure, like privacy laws, the impact on IT security, the attractiveness of work conditions for staff, the effect of complexity on IT maintenance, and the impact on external communications partners. They also included values like open standards, vendor and procurement independence, stability, continuity in purchasing, and the protection of investments. Unilog translated these into a matrix, and assigned a maximum of 10,000 points to each of the five alternatives.

Munich considered dependency on Microsoft to be acceptable as long as substantial independence remained in crucial areas, such the ability to set up backoffice services without MS products. Unilog observed that this independence had become increasingly problematic. Operationally, Microsoft's product policy had forced Munich to migrate its operating systems even though there was no functional reason to do so. Strategically, the current generation of MS products, because of their high degree of integration, creates pressure to deploy additional MS products. It is, for example, nearly impossible to run clients securely under XP without the corresponding MS backoffice services. Microsoft did garner high scores for the reusability of existing staff know-how and for its de facto standard data formats.

In all other areas, F/OSS scored higher. It does not create vendor dependency, as there are many software and service providers—including

noncommercial ones like the Federal Office for Security in IT (Bundesamt für Sicherheit in der Informationstechnik -- BSI). It was rated superior with respect to privacy, security, and flexibility; higher in its capacity to improve the manageability of an IT infrastructure, including IT enterprise and IT employee management; and higher in its capacity to reduce the complexity of large systems.

Applying these strategic and qualitative criteria to the five options reversed the results. F/OSS scored the highest, garnering 6,218 out of 10,000 points, while the upgrade to Microsoft XP proved the least attractive solution, with 5,293 points. At this point, the study recommended a pure free software strategy. It also warned that migrating more than 14,000 systems and 16,000 users would be risky if not planned and managed properly.

After the release of the report, both Microsoft and the major free software protagonists, SuSE Linux AG and IBM Deutschland GmbH, made new last-minute offers, which Unilog included in the addendum to its study in July, 2003.

Microsoft informed City representatives of a recently concluded general contract with the Federal Interior Ministry in which it guaranteed that it would not abuse its monopoly on pricing and contractual conditions over a period six years. This level of cooperation also promised better responsiveness by Microsoft in implementing public administration standards and interfaces into MS products, and in answering the security demands of the public administration. Even though Microsoft did not discount its products outright, the new arrangement implied a savings of several million Euros. These savings came in several forms— especially better synchronization of update costs with the actual migration of workplaces. By continuing to use the XP configurations until 2010, costs for a follow-up migration after 2007 could be dropped. This offer raised Microsoft's score on both financial and qualitative strategic criteria.

IBM and SuSE also altered their proposals in ways that lowered the cost estimates for the F/OSS solutions. Both companies offered

migration consulting for free. SuSE offered an alternative PC emulation with a significantly lower price. Other offers by SuSE were closely linked to the use of SuSE products, the deployment of which had not yet been decided. In the course of this process, the free software solutions also picked up additional points. Improvements to OpenOffice, especially better support for the PDF format, were made available around this time. This was a significant enhancement because of the widespread use of PDF in Munich's administration, and because of PDF's emerging status a standard for communication with external partners.

A new round of evaluation of the revised bids yielded roughly equal cost effectiveness for the two major alternatives at a slightly lower cost level for both. In this new round, the XP/XP solution led the F/OSS solution by only about half a percentage point. The process proved to participants that the monetary aspects of software choice were highly volatile. In this context, the study framed the migration decision around (1) relatively modest differences in short-term financial costs; and (2) greater differentiators among the mid- to long-term qualitative strategic issues.

The study, in its various phases, was commissioned by the Council and directed primarily at its decision making. This gave Unilog's recommendations considerable legitimacy. The quality of the study and its clearheaded presentation of the options— including the expected difficulties—were convincing. The serious discussion of F/OSS adoption at this stage—even prior to a final decision—did much to increase the comfort level and support for free software among Council members.

Intermezzo: A Visit from Redmond

At the end of March 2003, right before the City Council was to make its final decision on the future of Munich's IT infrastructure, Steve Ballmer, CEO of Microsoft Corporation, interrupted his skiing vacation in the Alps to visit Munich Mayor Christian Ude (57, SPD) in person to inform him about the new general

contract with the Federal Interior Ministry, and about revised offers to the City of Munich.

At about the same time, a number of internal Microsoft documents were leaked to the press, including a confidential e-mail, written a year earlier, that offered a glimpse of the company's strategy to combat its free competitor. "Under NO circumstances lose against Linux," wrote Orlando Ayala, then the top sales executive at Microsoft Corporation, in an e-mail sent to senior executives, including Ballmer, both vice presidents, the company's top lawyers and the general managers of Microsoft operations in Asia, Europe, Africa and the Middle East. As reported by the International Herald Tribune[13] Ayala laid out a strategy to dissuade governments from choosing free alternatives to the ubiquitous Windows operating system, especially on desktop computers. He told executives that if a deal involving governments, educational systems, or other large institutions looked doomed, they were authorized to draw from a special internal fund to offer software at a steep discount—or if necessary, for free. The "Education and Government Incentive Program" was intended to "tip the scales" toward Microsoft in these deals, but the fund was to be used "only in deals we would lose otherwise."

Among these documents was another e-mail written by the head of Microsoft's services department, Mike Sinneck, and sent two days after Ayala's memo. Sinneck gave details of Microsoft's "Business Investment Funds," which earmarked $180 million in 2003 for discounts on consulting services—especially in the server market where GNU/Linux is the company's strongest competitor.

Yet another confidential document cited by IHT was titled "Open Source Software Government: World Wide Initiative." This outlined the company's lobbying program to "prevent adoption of procurement policies favoring OSS." According to the strategic paper, Microsoft employees lobbied ministries in Germany, sought out favorable coverage in the French press, and built "alliances" with opinion leaders in Denmark. Indeed, a range of activities, from hiring the former Senator of Finance of the State of Berlin as the public sector relations manager for Microsoft Germany to regular contacts between Chancellor Gerhard Schroeder (SPD) and Bill Gates[14] could be cited in this context. The German Minister of Economic Affairs, Wolfgang Clement (SPD) appears to be an especially responsive target of MS lobbying.[15]

In an interview with IHT, the chairman of Microsoft operations in Europe, Africa and the Middle East, Jean-Philippe Courtois, defended the discounts by pointing to the similar tactics of its rivals, e.g. Sun Microsystems' free distribution of StarOffice. But the anti-trust assessment would be different for Sun than for Microsoft.

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[13]"For Microsoft, market dominance doesn't seem enough," by Thomas Fuller, International Herald Tribune, May 14, 2003, http://www.iht.com/articles/96289.html . See also a memo by Ayala from November 2003 discussing damage control in cases where governments and other major institutions are considering OSS alternatives to MS products (http://opensource.org/halloween/halloween8.php).

[14]During their most recent meeting at Davos in January 2005, it is safe to assume that Gates also raised the issue of the public sector market going open source in general and LiMux in particular.

[15]His most recent public appearance with Bill Gates was at an official sounding "First Summit on Security in the Information Society" in Munich (January 31, 2005), where the "Germany Securely on the Net" initiative was announced. Gates spoke about the need to make the IT infrastructure more secure, and described it as an effort that no single company could shoulder alone, not even Microsoft with its $7.8 billion research and development budget (2004). He therefore asked for support from government and other companies. The initiative, jointly operated with Europe's largest software company SAP under the auspices of Clement, does not make mention of the fact that switching to free software provides good protection against viruses and worms. (Bill Gates und Partner starten "Deutschland sicher im Netz," Heise News, 31.01.2005, http://www.heise.de/newsticker/meldung/55740)

Under EU law, a company that holds a dominant market position is prohibited from offering discounts that are designed to exclude competitors from the market. With Microsoft already the target of several antitrust investigations by the European Commission, the message the internal documents sent to Munich politicians was clear: a decision in favor of Microsoft under these conditions would be vulnerable to antitrust complaints by competitors.

The surprise visit by Ballmer to Munich Mayor Ude served to draw even more attention to the strategic decision and its potentially far-reaching effects. The external effect was to create a wave of sympathy for the Munich decision makers from many sides, urging them to stick with their original choice of F/OSS. Internally, it brought those still hesitating in the City Council firmly behind the anti-Microsoft decision. Since the Council had already announced that the qualitative strategic criteria regarding long-term sustainability would be decisive, Microsoft's price reductions were largely moot. Without the Ballmer visit, Hoegner concedes, it would have been more difficult to garner the complete support of the City Council.[16]

Second Phase: Working Out the Details

In spring 2003, a migration planning working group was set up that included members of all municipal offices. Involving them from the very start was seen as crucial to the success of the project.

On May 27, one day before the Council vote, Microsoft offered yet another price reduction of seven million Euros. This came after the Council had closed debate on new offers, and was not taken into consideration. Jens Muehlhaus from the Green Party and other Council member doubted the seriousness and, ultimately, the legality of such last-minute offers,[17] given the

recent revelations about secret Microsoft funds for combating Linux. For Munich, the goal of independence from single vendors retained widespread support. On May 28, 2003, the City Council voted to commission a detailed plan for migrating Munich's client computers to free software and web applications.

Two weeks later, the right-wing CSU opposition party in the Council announced that it would ask the State Government of Bavaria to investigate the decision. As the business magazine "Capital" reported, CSU Councillor Robert Brannekaemper argued that staying with Microsoft products could save the taxpayers millions of Euros. The magazine also quoted a Microsoft Germany spokesperson saying, "we've made the better offer." The company allegedly set its hopes on the CSU to reverse of the Council decision.[18] One day later, Brannekaemper denied plans to challenge the Council decision.[19]

After the Council decision, project leader AfID, with the support of IBM and SuSE/Novell, spent the next year developing a detailed migration plan—identifying suitable open source products and training options, and determining the technical feasibility and the costs of the migration.[20]

10-12, 2004, Berlin (audio and video recordings); http://wizards-of-os.org/index.php?id=557&L=3

[18]Münchner CSU stellt Linux in Frage, pro-linux, 12 June 2003, http://www.pro-linux.de/news/2003/5621.html

[19] Microsoft akzeptiert Münchens Weg zu Linux. Sprecher: "Wir planen keine rechtlichen Schritte gegen die Entscheidung," Rhein-Zeitung, June 13, 2003, http://rhein-zeitung.de/on/03/06/13/internet/news1.html?a

[20] Six project groups were established in parallel, again including members from the different municipal offices:
> (1) Client Configuration (choosing components for the standardized basic client and an installation where components are configured according to security demands, concepts for the

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[16]Sueddeutsche Zeitung, 2004, op.cit.
[17]Jens Muehlhaus, Member of the Bündnis 90/Die Grünen faction, Municipal Council, Munich, presenting LiMux on the "Free Software in the Public Sector" panel at the Wizards of OS 3, June

This concept development phase confirmed that the migration to free software would be neither gratis nor easy. The process revealed a range of deficits in the existing software infrastructure, and the migration became an opportunity to address them. Stepping back from these, the project leaders determined that a successful migration required consistent adherence to a number of technological and political principles: (1) applications should be OS-independent; (2) new client-server applications would only be developed or commissioned as web applications according to the J2EE model; (3) cooperation of all software partners would be necessary as software is customized, and as applications are redeveloped; (4) the project had to have the support of both political leadership and heads of the administration; (5) proactive education and involvement of employees would be essential. Hoegner: "I expect the changes concerning the individual workspace to be smaller than some might be fearing. We will do our best to adapt the look and feel of the future workspace to what our colleagues are used to today. Of

course, there will be some changes, but with major version changes in Windows or MS-Office in the past we also had to get used to new and different ways of using them. But now we are hoping for higher stability and security as an advantage of the new client operating system."[21]

During this process, some of the difficulties facing the project also became clearer. Ongoing high priority projects unrelated to the migration would have to continue. IT staff was lacking for many tasks. The small and mid-sized software companies providing applications to the city were still hesitant to embrace GNU/Linux and web-applications. And the question was raised as to whether specifying free software in the procurement procedure might be an inappropriate or unfair requirement. Legal specialists argued both sides—principally over the question of whether requiring F/OSS imposed an 'alien' condition that unduly restricted the pool of potential bidders in software procurement, and that was therefore noncompliant with anti-competition law and the principle of equal treatment. Parties disagreed on how this principle applied to the contracts in question, which combined software procurement with services, and more fundamentally about whether proprietary and free software were "comparable" goods (e.g. in respect to purchase price, follow-up costs, customization, modification). (In antitrust law, only "relatively similar" goods needed to be treated equally.)[22] Ultimately, the city won its argument that F/OSS could be categorically required on the basis of determinations about its efficiency for certain purposes—modifiability, security, and so on. This finding may not be definitive, and the question continues to be raised in F/OSS adoption discussions elsewhere.

administration and the change- and release management of the clients)
(2) Open Testing and Validation (hardware recommendations, defining test procedures and documentation for the basic clients, setting up a software distribution)
(3) Introduction and Training (a modular learning concept, after-care for staff beyond training)
(4) Migration Plan (determining data formats, cataloging existing specialized applications, macros and templates, standard cost calculations, developing and evaluating possible migration scenarios)
(5) Central Infrastructure and Services (for the host-base services provided by AfID, emulation or replacement of Siemens BS2000 and SAP environments, cost analysis)
(6) Communications (towards public servants and public: flyers, information events, target group communications, continuous information inside the municipal intranet, demo PCs in various offices where employees can get hands-on experience of the new office software).

[21]Interview with Wilhelm Hoegner, November 2003,
http://www.muenchen.de/vip8/prod2/mde/_de/rubriken/Rathaus/40_dir/limux/publikationen/interviews/ivhoegner.pdf

[22]Peter Hofmann, Rechtliche Risiken bei der Migration auf Open Source Software, at Systems 2004, 20 October 2004,
http://www.muenchen.de/vip8/prod2/mde/_de/rubriken/Rathaus/40_dir/limux/hofmann.pdf

The manner in which the project was conducted was also revised over time. Problems had arisen because the boundaries of the project and the role of the departments had not always been clearly defined. Key persons were not continuously available. And the economic analysis proved to be partly opaque.

The concept and planning phase was primarily directed at IT staff in the administration. Clear support from the City Council and administrative leadership, as well as an active communications strategy, helped generate acceptance among this vital group. By the end of the concept phase, support among IT specialists was high.[23]

Other European Cities: a Domino Effect?

The radiating effects of LiMux, which some had feared and others had hoped for, began to be felt in 2003. Following the example of Munich, Amsterdam announced in October 2003 that it was testing free software for server and desktop applications. In September 2003, the City of Vienna's IT department announced plans to assess the feasibility of a Linux migration for the city administration's desktops. Both cities each have 15,000 office PCs in use. Both projects are now well on their way. In 2005, the Austrian capital will offer half of its computer users the option of switching to GNU/Linux. After a thorough evaluation, a decision will be made regarding an extension of the plan. The estimated cost of the deployment foreseen by the city of Vienna is 1.1 million Euros over five years.[24]

The network effects of free software adoption also began to bear fruit in September 2004, when the IT officials of the cities of Munich and Vienna announced that they would share experience and expertise, and jointly develop free software applications. In particular, they targeted the development of a "public authority desktop" and of open source groupware.[25]

After the French Ministry of the Interior and its agencies had announced a comprehensive desktop migration plan, the City of Paris decided to launch a feasibility study for migration to free software in early February 2004. The study, again conducted by Unilog, concluded that a short-term migration to F/OSS would be difficult given the current state of the Paris' IT infrastructure and systems. However, the Paris City Council nevertheless plans to benefit from the economic advantages of free software and reduce its dependency on Microsoft products in the framework of its € 160 million IT Master plan for the modernization of the city's IT systems. A decision on the schedule of a possible migration to F/OSS is expected in early 2005.[26]

In May 2004, the City of Rome started to switch the first of its 9,500 desktops to Linux. "This can be defined as a political choice", said a council communication officer, adding that the debate on free software is being carried out at a national level, and that it brings together politicians from different political camps. A recent directive from the Italian Department for Innovation and Technologies said the adoption of free software could "widen the variety of opportunities and possible solutions in a

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[23]Peter Hofmann, Wie schaffe ich Akzeptanz für Veränderungen bei einer Linux-Migration, at Systems 2004, 20 October 2004, http://www.muenchen.de/vip8/prod2/mde/_de/rubriken/Rathaus/40_dir/limux/hofmann2.pdf

[24]See OSS Study – Open Source Software on the PC Workstations of Vienna's City Administration, 7 December 2004, http://www.wien.gv.at/ma14/pdf/oss-en.pdf

[25]Munich and Vienna to cooperate on open source software, IDABC eGovernment News, 13 September 2004, http://europa.eu.int/idabc/en/document/3279

[26]Paris migration to Open Source: evolution, not revolution, IDABC eGovernment News, 13 October 2004, http://europa.eu.int/idabc/en/document/3382/335

framework of equilibrium, pluralism and open competition."[27]

The Barcelona City Council voted in July 2004 to migrate the city's IT systems and desktops to F/OSS. The migration, which will be carried out progressively, started with a pilot phase in the social services department. One of the aims is to ensure that all software used by civil servants is available in Catalan—a small market language poorly served by proprietary vendors.[28]

While Spain is in general a strong promoter of free software, with the region of Extremadura running free software on over 70,000 desktops in public administration and over 80,000 in schools (see the contribution by Rishab Aiyer Ghosh), there are also examples of more cautious approaches. On January 5, 2005, the City Council of Valencia announced that it will continue to expand free software on its servers and plans to migrate its eLearning initiative to Linux, but that at present it was not planning any major migration on client computers. The reasons given included resistance from end users to switching from MS Office to OpenOffice, the use by the city of many specialized applications written in Visual Basic, and a lack of F/OSS alternatives for applications in areas like computer aided design (CAD) and cartography.[29]

In Northern Europe, the Norwegian city of Bergen declared in June 2004 that it would migrate its education and health services from Unix and Windows to a system built around SuSE Linux.[30] The Danish Municipality of

Naestved, in the context of a national pilot project, conducted a successful test of OpenOffice for a year. The outcome led to the unanimous approval of OpenOffice by all municipal organizations, leading the Naestved Municipality to announce, in December 2004, full deployment of OpenOffice. The primary reason offered was its lower cost.[31]

These are just a few impressions of what, from the perspective of proprietary software, no doubt looks like a domino effect. The trend will be further enhanced by network effects and collaboration among the various public sector players, including EU funding. In January 2005, for example, a group of European research institutions and open source software companies announced the joint development of tools to help reduce the complexity and cost of large-scale IT projects. The project, entitled "Environment for the Development and Distribution of Free Software" (EDOS), will develop two tools in particular: a distributed peer-to-peer application to help system builders install and integrate software components across dozens or even thousands of PCs and servers, and an automated quality testing suite for GNU/Linux installations or any other large application built on free software. Of the € 3.4 million projected cost of the project, € 2.2 million will be funded by the European Union.[32]

Third Phase: A "Soft" Migration

On June 16, 2004, based on the detailed migration plan, the City Council of Munich voted to move ahead with the migration of its desktop and laptop computers to free software. Only the CSU Councilors voted against the plan.

[27]City of Rome to migrate to Linux desktops, eGovernment News, March 12004, http://europa.eu.int/idabc/en/document/2207

[28]Barcelona City Council IS/IT Strategy 2004-2007 includes Open Source initiatives, IDA News 10 December, 2004, http://europa.eu.int/idabc/en/document/3640

[29] "Valencia not ready for full migration to Open Source on clients," IDABC, 5 January, 2005, http://europa.eu.int/idabc/en/document/3680

[30]Norway's second city embraces Linux, ZDNet UK, June 15, 2004,

http://news.zdnet.co.uk/software/linuxunix/0,39020390,39157677,00.htm

[31]OpenOffice in Naestved Municipality, Denmark, IDABC, 21 December 2004, http://europa.eu.int/idabc/en/document/3658

[32]Researchers get EU funding for Linux project, IDG News Service, 12/22/04, http://www.nwfusion.com/news/2004/1222reseagete.html

The actual migration phase started with the preparation of an open competitive bidding process for a contract to provide and support the new standard client configuration.

The exact composition of this basic configuration has not been finalized yet. It will certainly consist of GNU/Linux, OpenOffice and Mozilla as browser and mailer. It will likely include the Gimp, although cases might arise where specific plug-ins are required that make it necessary to run Adobe Photoshop in parallel. It will include a CD-burning tool like K3b and packaging software. Many other functions, like calendaring, will be implemented as web applications. For certain functions, solutions still need to be identified. For example, just about every available HTML-editor is in use in Munich's administration, and everyone is convinced that theirs is the best. Florian Schießl, head of the LiMux project office explains that this will have to be broken down into specific required functions and suitable replacements will have to be found. The original client study was not detailed enough to provide these answers.

The LiMux project has "The IT Evolution" written on its banner,[33] emphasizing that it is not conceived as a revolutionary action but as an evolutionary, step-by-step, learning-by-doing process. The goal is a "soft" migration over five years, starting with the easy transitions, making use of product life-cycles, and taking the necessary time for the hard problems.

Although there is support by AfID and the working groups, as well as a framework for a common migration path for all of the city's 17 administrative units, each of those units is responsible for its own migration plan and implementation. The migration will have to be managed mainly by existing staff, without interrupting the operations and services of the departments involved.

The common migration path consists of three phases. In phase 1, Mozilla and OpenOffice will be installed on all workstations, replacing the

combination of MS Office and Netscape or MS Internet Explorer. Since OpenOffice can read most existing MS Office files, the migration of data from proprietary to open formats will proceed slowly. The migration teams have not yet defined the standards and open file formats to be used in the end. Phase 1 started right after the June decision and will be concluded for most departments in 2005. The remaining departments will finish by the end of 2006.

Phase 2 involves replacing other non-problematic software (e.g. general office applications) by free software and switching non-problematic workstations to GNU/Linux. Emulation systems for Windows applications (e.g. VM-Ware, Wine or terminal servers) are to be used only when no other solution can be found. The long-term goal is a complete shift to free software. The parallel use of free and proprietary operating systems was considered too demanding on the IT administration. For this reason, it was determined that the existing NT systems be used until the end of their life-cycles.

At first, newly procured PCs will be equipped with Windows NT and, in a few cases, Windows 2000—even if they come with Windows XP pre-installed. During the second phase, most PCs will have GNU/Linux installed from the start. Simultaneously, either native Linux solutions or Web-based services will be developed to replace nonstandard proprietary applications, including applications specific to the public administration. Web implementation makes the applications independent from the operating system and ensures an easy switch to another OS in the future. The migration team assumes that, as a consequence of developing market trends, more and more applications and hardware will be available for open source systems. This phase also started in summer 2004 and will be concluded for all departments by the end of 2007.

In phase 3, the most sensitive software, e.g. software concerning data protection and professional data processing, will be migrated to F/OSS. This phase will start for the first departments in 2005 and continue until the end of 2009.

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[33]LiMux – the IT-Evolution,
http://europa.eu.int/ida/servlets/Doc?id=17200

Total Cost Estimate

Initial Costs 18%
Licenses 7%
Application Migration 10%

Total Cost 35 Million Euros

15%
Conversion of Macros, Templates, and Forms

38% **Training**
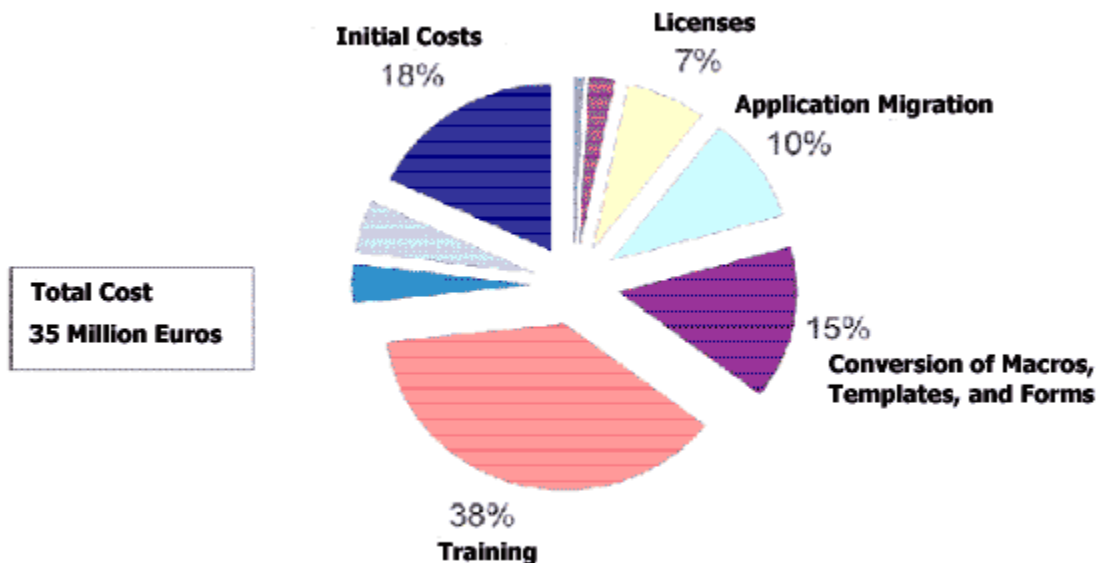
Key to the success of the migration is a well-defined communications process between the migration teams and end-users. Employees were educated early on during the planning phase by intranet presentations, introductory seminars, flyers, demonstration systems and personal *Migration plan cost estimates.*

discussions about the new system. The goal of the information dissemination is to decrease worries and reservations about the use of free software among public servants. Employee training started with the beginning of the first client replacements.

Intermezzo: Software Patents

European Commission plans for a directive concerning the patentability of computer-implemented inventions have been hotly debated since the first draft for a directive was released in February 2002. In fact, it gave rise to one of the most powerful single-issue civil society movements of the digital age.[34]

The intention of the Commission is to codify the current state of law in order to harmonize administrative and judicial practices in Europe. It also wants to demarcate them from the current practices in the US where, since a ruling

in 1998, computer programs are patentable even if they do not provide a technical contribution to the state of the art.

That an invention has to be novel, of a technical nature, and commercially applicable in order to be patentable is undisputed. At the core of the controversy is the definition of *technicity*. After a significant number of changes to the Commission draft, the EU Parliament issued a new draft on September 24, 2003. It restricts the patentability of computer programs to those that serve in the automatic production of material goods, and that have an industrial rather than generally commercial applicability. If it were passed it would exclude nearly all computer-implemented inventions from patent protection.

The EU Council issued a new draft in May 2004. Closer to the original Commission draft, this version of the Directive codifies and harmonizes current European jurisdiction. Aside from clarifying that business methods and other methods not based on controlled utilization of forces of nature are excluded from patentability, this draft would not significantly change the current state of law, which has led to the granting of around 30,000 software patents by the European Patent Office so far.

The European Directive cast its shadow on LiMux in July 2004. Green Party City Councilor Jens Muehlhaus, in two motions, asked the

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[34]See http://swpat.ffii.org/.

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Mayor to intervene. In one, he pointed to patent research by the Foundation for a Free Information Infrastructure (FFII) that had indicated that the LiMux basic client configuration might infringe more than 50 existing European patents. On this basis, he asked the Council to investigate the possible consequences of the proposed EU Directive for the LiMux project.[35] In the second motion, Muehlhaus asked the Mayor to urge the Federal Government to reject the Council draft and support the Parliament draft.[36]

On August 4, 2004, the press reported that the City of Munich has put its migration plans on hold due to worries that the looming EU Directive might make the City vulnerable to patent disputes. The night before, Munich's CIO Wilhelm Hoegner had told the members of one of the LiMux mailing lists that the call for tenders for the basic client, planned for the end of July, had been stopped. Pointing to the motion of the Green party, he wrote that the legal and financial risks needed to be assessed before the procedure would resume.[37] Florian Schießl, head of the LiMux project office, sees this statement as an indication of the normal and reasonable procedure to consider all factors before issuing a call for tenders. By calling it the end of LiMux, FFII blew it out of proportion.

Nevertheless, it was evident that such patent infringement assertions against free software

could cost the City huge sums in legal and possibly licensing fees, and even disrupt the business of whole departments. Hoegner stated that it was "indispensable" to find out what consequences the EU directive would have on open source software. Uncertainty, he said, "could be a catastrophe for Munich's Linux migration project and for open source in general."[38]

The City administration remained committed to the migration but stopped the call for tenders for the basic system. Furthermore, it decided to commission a legal study on the risks of software patents and to demand clarification and legal certainty from the German and the European governments. What emerged quickly became known as the "Münchner Linie" (Munich Line), and consisted of three elements: (1) continuing on the migration path to free software; (2) reaching clarity and legal certainty about the patent risk; (3) asking others who support free software to join the effort and make their voice heard.

One week later, on August 11, Munich Mayor Christian Ude reversed the decision, resuming the call for tenders but also reiterating the need for clarification from Berlin and Brussels on the risks to free software created by the upcoming directive. LiMux was back on track again.

The law firm Frohwitter was commissioned by the City to assess the implications of a possible EU directive on patent litigation for Munich. It released its study on September 10, 2004, and looked at three different scenarios. [39]

[35]http://www.gruene-muenchen-stadtrat.de/seiten/texte/antraege_htm/A04/anfragen04/anfrage_0407030.html

[36] http://www.gruene-muenchen-stadtrat.de/seiten/texte/antraege_htm/A04/antraege0409/antrag_040730a.html. In the German Parliament, the green, the liberal and parts of the social-democratic party are opposed to software patents, while the Minister of Justice and the Chancellor, both social-democrats, are in favor.

[37]Stadt München verschiebt Ausschreibung für Linux-Basis-Client, ComputerPartner, Online-News, 5.08.2004, http://www.computerpartner.de/index.cfm?pageid=3&type=detail&artid=167317&IssueID=1

[38]Münchner Grüne sehen Linux-Migration durch Softwarepatente gefährdet, Heise News, 30.07.2004, http://www.heise.de/newsticker/meldung/49605

[39]Legal study "Rechtliche Bedingungen und Risiken der Landeshauptstadt München für den Einsatz von Open Source Software," law firm Frohwitter, 10 Sep 2004. [in German], http://www.ris-muenchen.de/RII/RII/DOK/SITZUNGSVORLAGE/517379.pdf; see also Peter Hofmann, Rechtliche Risiken bei der Migration auf Open Source Software, at Systems 2004, 20 October 2004,

- Under the current legislation, computer-implemented inventions are patentable, and therefore software can infringe patents. But because patent litigation is costly, potential gains from licensing are low (since only certain functions of a program can be protected). Furthermore, infringing functions can be replaced by non-infringing implementations. In this context, the study estimated that the risk of the City of Munich becoming the target of a patent lawsuit was low.

- If the EU Parliament draft of the directive were passed, such risk would be further diminished because the City does not use its software in the production of material goods. On the other hand, the study anticipated problems due to contradictions within the draft, which would create legal uncertainties and possibly bring the EU and its member states out of compliance with the WTO Agreement on Trade Related aspects of Intellectual Property (TRIPS), leaving the EU and its member states open to compensation claims by other TRIPS signatories.

- If the EU Council draft were passed, the main effect would be to write current practice into law, thereby increasing legal certainty but not significantly changing the larger picture. Under this scenario, the risk assessment is the same as in the first scenario.

In conclusion, the study denied that the City's migration to free software created a higher risk of exposure to patent infringement lawsuits. That risk does not differ from that of proprietary software. Here the distinction between patent and copyright plays an important role. The fact that F/OSS source code is open makes it more vulnerable to copyright infringement claims—potential litigants can scan

the software for infringing snippets of code. This is the basis of several legal disputes and challenges to F/OSS (see Jennifer Urban's contribution to this report). Patent infringement claims, in contrast, have to be based on a functional analysis of the software unrelated to the source code—a situation of equal jeopardy for free and proprietary solutions. In practice, proprietary software companies have been targeted by patent litigation; GNU/Linux, to date, has not, even though it has been in use for over ten years. Claims against the Linux operating system kernel are especially unlikely, Frohwitter argued, because most of its functions date back to the 1960s.

To minimize the remaining risk, the study made several suggestions. All software procured by the City of Munich should contain an assurance that the software is unencumbered by third party rights. Such assurances could be strengthened by participation in a number of collective efforts designed to lower the legal uncertainty surrounding F/OSS. Because patent infringement suits are regularly answered by a challenge to the validity of the patent, the study recommended that the City join efforts by the free software community to document its prior art—an important step in proving that an invention was not novel at the time of the registration of the patent. It also recommended that the City form alliances with other partners in the public sector to jointly fend off patent attacks. Finally, it recommended obtaining some form of insurance to cover litigation costs, but expressed ambivalence about new insurance products that cover claims arising from patent infringement.[40]

In the worst case scenario, a patent attack would prohibit city staff from using a specific function of a given computer program. The city would then either have to pay the licensing fees for that function or replace it with a non-infringing implementation.

In August 2004, the New York-based company Open Source Risk Management (OSRM) also

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http://www.muenchen.de/vip8/prod2/mde/_de/rubriken/Rathaus/40_dir/limux/hofmann.pdf

[40]E.g. Open Source Risk Management, http://www.osriskmanagement.com/

released a report on this issue, echoing the results of the Frohwitter study. The OSRM study also found that patent risks should not deter users from migrating to Linux, even in the US. According to the study, "not a single software patent fully reviewed and validated by the courts is infringed by the Linux kernel." Although it determined that "283 software patents not yet reviewed by the courts could potentially be used to support claims of infringement against Linux," the study concluded that "this is not a level of potential infringement greater than that of proprietary software."[41]

The research company Gartner also weighed in on the Munich question. "Legal risks mostly come from U.S. patents, and no vendor with relevant patents seems to have shown any interest in threatening or initiating a lawsuit," said Andrea Di Maio, Research Vice President at Gartner. Speculating about Munich's motivations, Di Maio recommended that cases for migration not overrate patent-related risks. Indeed, Gartner favored shifting the argument from risks to benefits: governments needed to pay special attention to "any positive impact that a large-scale migration might have on local economic development, the competitiveness of the city or region, and similar issues."[42]

The controversy around software patents and LiMux caused mixed reactions among the free software community. There were those who saw it as a panic reaction, out of proportion to the actual cause, and irresponsible in raising unfounded worries. After all, IBM is involved in LiMux, and what contender would dare start a patent suit against such a patent-rich corporation?

Others argued that it would be irresponsible not to take the risk seriously, pointing to cases in

Sweden and the UK where public administrations had been involved in software patent lawsuits already. Munich will subcontract much of its software development to SMEs, which are not protected by large patent portfolios against claims.[43] Others praised the Munich City politicians for skillfully leveraging the attention that LiMux has attracted in order to influence the European law making process.

The German free software industry association LIVE spoke of an overreaction, but at the same time welcomed the escalation of the discussion on software patents.[44] Indeed, LiMux has become a widely cited example of the policy discrepancy between the German government's use and encouragement of free software and its promotion of the European patent legislation, which would certainly not improve the climate for free software development and utilization.

In the end, the Frohwitter study had a reassuring effect on the City Council. On September 29, 2004, it confirmed the original vote to proceed with the migration.

First Results and Next Steps

The first phase of the migration started in mid-2004. The first users in Munich's public administration are experiencing tangible results on their desktops.

The Europe-wide call for tenders for support and maintenance of the standard basic clients was concluded at the end of 2004. After a first round of negotiations with the bidders, modifications of the offers and a second round of negotiations, the decision was to be announced in March 2005. IBM and SuSE, who volunteered their support in the production of the migration plan, were considered strong candidates. Among proprietary software vendors, only Microsoft participated in the bidding. Unlike most calls for tenders, the

[41] Mitigating Linux Patent Risk, position paper by the OSRM, http://www.osriskmanagement.com/linuxpatentpaper.pdf

[42] IDA News, 24 August 2004, http://europa.eu.int/idabc/en/document/3231

[43] Münchner Linux-Patentängste: Eigentor oder notwendige Zuspitzung?, Heise News, 05.08.2004, http://www.heise.de/newsticker/meldung/49782

[44] http://www.linux-verband.de/

specifications in the LiMux cases were general at first, and were being detailed in the course of negotiations with the bidders. Procedural rules have also been applied in ways to better accommodate freelancers, explains Schießl.

The final decision announced on April 14, 2005, came as a bit of a surprise to many. The winner for this contract was not IBM but a consortium of the two SMEs, Softcon and Gonicus. They will be deploying not SuSE but Debian GNU/Linux, the freest of the Linux distributions. LiMux Project Lead Peter Hofmann was very happy about the strong interest in the call and the high quality of the bids. They confirmed, he said, that Munich is on the right track. "The market showed that Linux on the desktop is not an exotic solution. With the planned migration the goal of the largest possible vendor independence can be reached while at the same time ensuring professional IT operations by the Bavarian capital."[45]

The call for training materials and the e-learning platform, and a third call for project oversight have also been concluded and are now in the second round of negotiations. Although it was decided to conduct the migration with the existing IT personnel, additional support was found to be needed for the migration of office applications. Nine new posts were created, seven externally and two internally. When the press reported the job openings, there was enormous interest.

The actual migration puts the end-users at the center. Communications, training and support are core tasks at this point. Although general information sessions for City staff have been conducted since the beginning of the project, more intensive user training and support have begun as the first desktops are migrated. Having learned from the previous phase, there are now clear boundaries for the project and clear roles of the departments. Key personnel are now continuously available.

The efforts to date have raised the level of acceptance of F/OSS among end-users, but the difficulties of the actual migration and day-to-day support are becoming apparent to IT staff, and support among them has dropped. From this experience, project coordinators have drawn the conclusion that support is not reached once and for all but has to be strived for continuously.[46]

Other problems arose as well, including the entanglement of the LiMux project in plans for a general renovation and consolidation of IT services in Munich.[47] A major overhaul of an IT infrastructure cannot, of course, simply aim to reproduce the status quo ante. The ICT processes that the migration will re-architect in free software are themselves in flux. In March, 2004, City Councilor Christine Strobl (SPD) proposed revamping AfID into a comprehensive central IT service provider, in part so that IT units in the different departments could focus on their own areas of core competence. AfID, under this new regime, would help make the IT infrastructure more manageable by standardizing products and moving applications to the web, as well as consolidating the management of IT projects and introducing ITIL processes[48] in order to increase transparency and comparability of IT processes.[49] While Strobl emphasized that this strategic reorientation of the city's IT organization is unrelated to the migration to free software, the two projects are obviously linked. Changes in IT management will affect LiMux, just as LiMux, with its web-centric strategy and long-term commitment to open systems, will affect the more general modernization of the city's IT services.

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[46] Hofmann, Akzeptanz, op.cit.

[47]Hofmann, Akzeptanz, op.cit.

[48]The Information Technology Infrastructure Library (ITIL) was initiated by the UK government 15 years ago and is now a standard for IT service management in the private and public sector. (http://www.ogc.gov.uk/index.asp?id=2261)

[49]http://www.ris-muenchen.de/RII/RII/DOK/ANTRAG/455941.doc

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[45] "Projekt LiMux: Partner für den zukünftigen linuxbasierten Basis-Client steht fest," 14 April 2005, http://www.muenchen.de/Rathaus/dir/limux/publikationen/news_archiv/127730/basis_client.html

Next Steps

The second phase of the migration together with the newly announced software partners will start a bit behind schedule in fall 2005. Currently, system-management solutions for the clients and a user-management system are being established. The procurement procedures regarding the web-based re-implementation of the first specialized applications have also been announced by the municipality. And the development of an Office migration strategy has started, which will address the particularly difficult issue of consolidating and migrating MS-Office macros, forms and templates. (For example, the City's letter-head was produced by an MS-Office macro, which is now being replaced by a web-based solution.)

One of the next big challenges ahead is migrating sensitive software concerning, e.g., data protection and professional data processing. Key to this process is maintaining the integrity and continuity of services. This will continue until 2007, and there is hope that, in the meantime, more F/OSS applications relevant to these needs will become available. Especially problematic are areas like CAD and cartography, where free equivalents of standard proprietary solutions (AutoCAD, ArcInfo, ArcView etc.) do not exist. Specialized applications that interface with CAD software, for example, rely on APIs that are available only in Windows.

One of the big goals for the coming months will be to convince local software SMEs to adopt a Linux strategy. The main calls for tenders for the basic client and for training software were not something that a typical five-person free software company could handle, but the development of the special applications has traditionally been done by SMEs. Still, interest so far has been disappointing. In a survey among those companies who had worked for Munich before, about a quarter responded that they have Linux solutions ready. The other replies ranged from "We'll develop it if other municipalities will use it too." to "We won't develop for Linux." Windows-based software could be used for a transition period but, says Schießl, the goal is to use the market power of the city of Munich to bring its influence to bear on the local software industry and bring it around to F/OSS.

Networking between the developer community, the city administration, and other city politicians is considered crucial by all participants. But that doesn't mean it's easy, as Green-party City Councillor Jens Muehlhaus found out.

Muehlhaus and Open Source consultant Hamid Shefaat initiated a community-building effort around the LiMux project.[50] Muehlhaus sent out the first invitation in May 2004 to the city's IT departments, including AfID, and to Open Source companies (MySQL, PHP, and others). This led to charges by Social Democrats that the City Councilor was dangerously creating the perception that private friends would be favored in the allocation of public contracts. Plans for a membership fee of 12 €/person and 120 €/company, intended to cover server and other organizational costs, led to accusations that Muehlhaus was using LiMux to make money on the side. There were rumors that applicants had to belong to Muehlhaus' association in order to stand a chance in the public tender, even though there was no such formal requirement. The SPD argued that the right-wing opposition party CSU might use the community group as a basis for accusing Muehlhaus of bribery and corruption, undermining the LiMux process as a whole. As a consequence, Muehlhaus was effectively prohibited from calling meetings. Only the administration itself, which is managing the migration, or companies interested in the process could issue invitations to such meetings.

Thereafter, Muehlhaus pulled out of the networking activities, and Shefaat—who also belongs to the Green Party—took over the organizing role. At Shefaat's invitation, about 50 people from the developer community, companies and public administration came together on July 23, 2004. Hoegner of AfID was there to discuss the state of the project.

This gathering further angered the Social Democrats. An official complaint was issued by the City Directorate, which is affiliated directly

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[50] http://limux-project.org/

with the mayor's office. The Directorate put a stop to all further networking efforts, reaffirming the administrations monopoly power on convening meetings. Hoegner, himself from an old SPD family, actively supports the community building around LiMux and was very unhappy about these developments.

Muehlhaus explains this turn of events by pointing to the vested power structure. The SPD had been in power in Munich, with a brief interruption in the 1970s, since the end of the Second World War. As a result, the administration is to a large degree social-democratic as well. Traditionally, they are used to concluding general framework contracts with large industry partners—Big Politics working comfortably with Big Capital. They dislike the idea of having to deal with a wide range of smaller companies, and in this case possibly even with the long-haired nerds still widely associated with free software. There were also worries that, in these open meetings with the community, internal and possibly secret information might leak. Finally, the SPD Councilors driving the LiMux project, like Christine Strobl and Heimo Liebig, did not themselves have contacts in the free software community. Strobl is head of the SPD Council faction, Liebig is the faction's computer expert, who supported the migration on technical grounds. Their achievement is to have brought their party colleagues firmly behind the LiMux project. While they are open to the practical advantages of free software, procedurally they adhere to the traditional social-democratic way of joining big government to big business.

Ever since the SPD City Council faction held talks with IBM, the SPD has been perceived as favoring a framework contract with the multinational F/OSS leader. Rather than having to deal with dozens of SMEs, the migration and all its component tasks could simply be given over to IBM. Observers see this as another explanation for the SPD preventing community meetings: they could potentially coordinate the power of the SMEs, and thereby call into question the rationale for a large, single industry partner.

All these presumptions may have been derived from long experience, but Munich politicians proved critics wrong. If the guiding principle of many public sector decisions in the past was: 'No one will blame you if you buy from the market leader,' LiMux breaks with this tradition as well. The contract for the basic client was awarded to two SMEs who joined together for the call. Gonicus is a 15 person company in the small town of Arnsberg, and Softcon is a Munich-based stock company with a staff of 120.

The project leads—Wilhelm Hoegner, Florian Schießl and Peter Hofmann—are convinced that networking with the community is essential for the success of the project. Hoegner would like to contract all the development and integration that AfID cannot do on its own to companies from the local community. All three of them regularly go to free software events like Systems and LinuxTag, presenting the project and looking for dialogue. And they are actively involved in some of the free software projects but as private citizens, not in their official capacities.

The final challenge of the LiMux project will be to share it. The experiences around LiMux, including elements like the Open Test & Validation Center, the training model, and the larger adoption plan and decision process will be provided to other municipalities and public administrations.

Conclusions

Open Source Adoption as exemplified by LiMux is a multi-layered process with a range of constituencies. In the LiMux case, although the political arena was very important, the driving force behind it was the technical departments in the public administration. LiMux confirms a lesson learned from many free software deployment projects: when making technological decisions, listen closely to the technologists. They have to build it, they have to make sure it is secure, stable and reliable, they have to maintain it, and they have to support users. Security, stability and reliability are also what users want, but the IT landscape is such that much of the technical meaning of those values is beyond the comprehension, and partly beyond

the control, of the average user. Intimate knowledge of IT architectures and their maintainability usually makes the technical intelligentsia opt for free software. For technical users, Unix-based systems are the norm, and GNU/Linux is the de facto standard for Unix (along with BSD preferred for security sensitive services).

In the 1990s, it was common for IT administrators, whether in a company or in the public sector, to simply install on their servers what they found most suitable to their tasks. In many cases, they were running free software without any explicit approval or awareness on the part of other departments and senior managers. Today these choices have become foregrounded, both in the sense that there is considerable work to be done to educate and integrate nontechnical staff into the decision making process, and in the sense that there is considerable opportunity for nontechnical staff to see F/OSS as an extension of broader social and political values—such as independence from vendors. The LiMux experience strongly suggests that the adoption process works both ways.

In case of LiMux, Munich's CIO Wilhelm Hoegner took the initiative. He and AfID played the key roles in developing the software assessment studies, and later the detailed plan for migration. They provided the City Council with a solid basis for its decision making. Of arguably more importance, Hoegner took professional risks to defend the idea that free software is a viable alternative to Microsoft. Hoegner did so in City Council committee meetings and in public. And if it took his wife to convince committee members of OpenOffice's user-friendliness, he also arranged that proof.

Both in the public and the private sector, the financial administration plays a decisive part as well. Bavarian Audit Office admonishments to the public administration to make use of the cost savings potential of F/OSS wherever possible was an important, indirect, atmospheric factor in Munich's decision making. LiMux showed that calculating the TCO of large-scale IT systems is not as easy as comparing prices for milk in three different supermarkets. Even the prices

themselves prove flexible, as the last-minute reductions offered by both contenders demonstrated. Contractual terms and conditions can impact both initial and ongoing costs, as well as other complex elements of budgeting and public accounting. The technological infrastructure for the internal and external information and communications operations of an organization obviously has complex dependencies—not all of which were anticipated in the very extensive run-up to LiMux.

Decisions in the highly dynamic area of IT also have to take into account unreliable predictions about technological trajectories, markets, shifts in the global IP regime, and other 'exogenous' factors. The timescale therefore is crucial. The Unilog study showed no short term cost advantage of free software over Microsoft solutions. What looked like a nominal Microsoft advantage in the short-term, however, was perceived as a road toward dependency and hidden costs. Munich took a mid- to long-term approach, trying to capture some of the softer, indirect effects of its choice in applying what it called qualitative and strategic criteria. Taking into account these policy goals, the results of the study favored F/OSS to a degree that surprised even specialists like Hoegner.

On the political level, the decision was recurrently and actively framed by another form of argumentation. "The Munich City Council was not just faced with a decision about operating systems but had to grapple with fundamental questions about monopoly or democracy. This issue stirs and polarizes people," says Jens Muehlhaus (31, Bündnis 90/Die Grünen), the City Councillor who most actively promoted the LiMux project. Muehlhaus speaks of a wave of approval when David won against Goliath, but also of skepticism among the public servants on the receiving end of the migration.

Concern for the soundness and sustainability of Munich's IT infrastructure and the budgetary implications of software choice, of course, also figured highly in the political arena. Over time, says Muehlhaus, the Greens and the SPD became confident that free software provided a sophisticated, secure, and cost-effective system

with all the required features—as well as being easy to learn and compatible with the main proprietary data formats. In addition, the City Council has to take the local job market into consideration. Munich has traditionally had a strong IT industry, but lately companies like Siemens have started moving jobs abroad. While a Microsoft solution would not have created a single new job in the region, there is a fair chance that the free software choice will create new jobs and secure existing ones in a range of local small- and mid-sized enterprises (SME). "With the decision for F/OSS, there is a chance to create jobs in Munich and Europe. That was very important for us," says Muehlhaus.

Munich Mayor Christian Ude (57, SPD), like some of the other Councillors, took some convincing at first. He covered his back with internal and external expertise, and then wholeheartedly supported Munich's move to free software. He is obviously enjoying the attention the City Council's decision drew domestically and abroad, including the personal visit by Microsoft CEO Ballmer. The fact that other major European cities are following in Munich's footsteps confirms his idea that Munich is playing a vanguard role. One might project a sense of European solidarity vis a vis the US into this movement, but Ude rejects accusations of anti-Americanism. He points to US companies like Sun, which congratulated Munich for its decision in full-page ads.[51] While European public and private decision makers may primarily be concerned about Microsoft's misuse of its market dominance, there is a larger underlying conflict. The EU Commission anti-trust investigations against Microsoft have shown differences in the understanding of fundamental concepts of anti-trust between the EU and the US. Other current disputes arise around concepts of privacy. But in the end, free software is no more European than proprietary software is US American. Ude's main line of public argument is anti-monopoly. He took the fact that both Microsoft and IBM/SuSE

corrected their offers downward during the last phase of decision making to prove that competition is good for business.

From a business perspective the choice was as clear as from the technical perspective. There was only one competitor to free software: Microsoft. It was Microsoft that forced the city to introduce a new generation of IT in the first place by discontinuing Windows NT. While the city was willing to consider Windows XP, both on technical and economic grounds, a number of the features of the Microsoft path were problematic—vendor lock-in, privacy concerns about the software sending information back to Microsoft, and the new leasing arrangements especially. Offering price reductions did not only fail to meet the demands of the Munich decision makers, it was also especially untimely when news about the company's war chest for public sector lobbying and refunding broke. Finally, the surprise visit by Steve Ballmer to Munich Mayor Christian Ude showed how desperately Microsoft wanted the contract. Without this visit the motion in the City Council might not have passed, says Hoegner.[52] Nearly all moves by Microsoft in the Munich process served to drive the city toward its competitor. It seems that in the many-layered processes of open source adoption, Microsoft is not only a strong enemy but at the same time the best ally of free software.

A last and decisive layer to the LiMux process is the users. On the server, free software is largely invisible to users. Migrating desktop systems on the other hand, obviously needs their active cooperation. They are the final proof of the pudding. Even if technologists are convinced of a given solution, it is users who have to feel comfortable with them in the end. Hoegner testing OpenOffice on his wife is emblematic of this approach.

LiMux was started by technologists working toward what seemed to them the right thing to do. This drew worldwide attention because it hadn't been done before, not on this scale, and not on the desktops of a complete municipal

[51]Christian Ude, Hier schreibt der OB: "Software: Mauerfall an der Isar," 16.6.2003, http://www.muenchen.de/Rathaus/lhm_alt/mde/ob/03/43007/0616.html

[52]Sueddeutsche Zeitung, 2004, op.cit.

administration. As early adaptors, they had to be willing to take the heat, and they did. As a consequence, LiMux brought Munich into the limelight. Struggles over issues ranging from international intellectual property regimes to the global business strategies of players like Microsoft and IBM all played out in the hallways of the Bavarian capital. Muehlhaus told me: "On the small-scale of municipal politics we were able to turn a very big screw." He obviously enjoys being invited to other cities and countries interested in the success story of LiMux, where he repeats: "When David won against Goliath, that was fun."

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SOURCE VS. FORCE: OPEN SOURCE SOFTWARE MEETS INTERGOVERNMENTAL POLITICS

Kenneth Neil Cukier

As in national and municipal contexts, the role of open source has begun to be debated in and, in some cases, advanced by intergovernmental organizations (IGOs). This marks a significant development in the relationship between open source and public policy. In some respects, it creates opportunities for national actors to offer "stealth support" to open source in settings where they face less direct pressure from proprietary software firms, and where the multilateral environment can diffuse accountability for controversial stands. The different missions, operational constraints, degrees of autonomy, and outside scrutiny that characterize the IGOs offer a range of new niches for open source politics.

This contribution analyzes the growth of the open source debate within intergovernmental organizations, focusing on three venues where open source has become an important and divisive topic: United Nations agencies (particularly the United Nations Development Program); the World Intellectual Property Organization; and the World Summit on the Information Society. It examines the politics of national actors operating in this sphere, and describes lines of support and resistance that coalesce around open source proposals. Finally, it examines the benefits and drawbacks of encouraging intergovernmental organizations to address open source software explicitly. Working at this level brings dynamics into play that are different than those of national and municipal policy, or of the marketplace.

Introduction: National Governments and Open Source

The core characteristics of free and open source software (F/OSS)—nominal costs of acquisition, a high degree of modifiability, and openness in terms of standards and protocols— answer a number of basic governmental IT needs, ranging from general concerns with costs

to more expressly political concerns with political transparency, national autonomy, security, and sovereignty. Like commercial firms, governments are major customers and users of information technology, and operate under similar pressures to reduce technology expenditures. As governments deploy and update e-government services, they require systems that are not only designed to their specific needs, but that can be modified as those needs develop.

Though not the sole province of open source, open technical standards are also a priority. Accessing public documents, for example, shouldn't require payment to a third-party firm, either by the state or by individuals. Access should survive both the expansion of features and possible shifts in software tools. Implementing this basic level of access and transparency as government operations shift to digital services is arguably a fundamental requirement of an open society in the digital era. Although few international organizations state this explicitly, it is clearly an underlying ethos of many actors within global governance institutions.

The F/OSS agenda often overlaps other state objectives, such as encouraging the growth of local technology sectors, ensuring the security of critical software, or eliminating expensive licensing payments to foreign suppliers. Dependence on private, foreign-owned monopolies for basic software infrastructure is increasingly perceived as a problem for states, rather than a sign of inclusion in the global information society. The often clumsy display of Microsoft's monopoly power has done much to elevate these concerns. A Microsoft official, in a private email to the corporate investor Warren Buffet, once referred to the company's position as a "toll bridge" on the information highway that the world had to pay in order to

participate.[53] With the growth of state-based promotion of open source, we are witnessing a form of geopolitical, not simply market, resistance to Microsoft's dominance.

Since 2000, many countries have sought to promote open source software through legislation (Evans, 2003). The results have been uneven. A study by the Center for Strategic & International Studies in 2004 showed that more than 45 nations have considered some sort of policy on F/OSS; slightly more than half of those countries went beyond the proposal stage and voted on official legislation. Of the countries that approved legislation on open source, the vast majority of laws merely encouraged its use, stopping short of imposing binding requirements in favor of F/OSS or explicit limits on the use of proprietary software. Of the roughly 24 proposals mandating F/OSS use, none ever went into effect (CSIS, 2004).

European and emerging industrial powers— especially China and Brazil—have been the leaders in F/OSS adoption policy. For these countries, software licensing costs are high and sovereignty issues have special resonance. Both issues figure centrally in discussions about software choice. On several occasions, China has considered national rules that would give priority to F/OSS in government purchases, but it has not (yet) made this official policy. Brazilian F/OSS advocacy has arguably been the most successful at the national level: Brazil now has an official, national-level open source strategy (detailed in Eugene Kim's contribution to this report). In Europe, the UK and France have signaled preferences for open source, although major government contracting continues to favor proprietary software. In many other countries, such as South Africa, the adaptability of software interfaces to local languages has been an important but not yet decisive factor.

This pattern of half measures at the national level reflects four political factors.

- First, national governments remain internally divided on the open source issue, for reasons ranging from unfamiliarity with the provisioning problems of IT infrastructure, to fear of transition costs, to the belief that the commercial marketplace remains the best (and neutral) determinant of software solutions.

- Second, governments have sometimes made strategic use of open source adoption as a bargaining chip to obtain better deals from propriety software companies, namely Microsoft. (Microsoft's strategy of underbidding against F/OSS competitors is detailed in Volker Grassmuck's contribution).

- Third, there has been significant pushback from proprietary vendors, who have marshaled both political and financial capital to lobby against open source (examples of this are noted later in this essay).

- Fourth, F/OSS expertise and advocacy capacity is unevenly distributed, and therefore often better positioned to mobilize resources within smaller institutions, such as municipal governments and organizations. At these levels, the greater diversity of politics and needs, and the greater opportunities for engagement by small groups of committed actors has produced a wider spectrum of policy choices. (The F/OSS adoption policies of two notable examples, Extremadura, Spain and Munich, Germany, are detailed elsewhere in this report.) Significantly, these can be the thin wedges that shift calculations about national-level policy, as in the case of Brazil.

For all the flirtation with F/OSS at the national level, however—and with the singular exception

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[53] Email to Warren Buffett from Jeff Raikes, a Microsoft vice president, sent on August 17, 1997. The email was entered into evidence in the 2004 Minnesota antitrust case against Microsoft, and thus made public.

of Brazil—formal adoption policies still exact too high a political cost.

The movement up the policy ladder into intergovernmental organizations (IGOs) is very recent, dating to around 2002. F/OSS activity at this level parallels the growth of (and increasingly finds a home within) broader civil society and developing-country efforts to use the development agendas and representative structures of the IGOs to promote more equitable practices of globalization. The IGOs offer a different set of opportunities for F/OSS advocacy, in some respects enabling governments to offer "stealth support" to open source. Controversial stands can be shared among country representatives, and—if successful—responsibility for national compliance can be displaced to international bodies and norms. International civil servants, for their part, are often less exposed than domestic politicians to the impact of campaign contributions and direct foreign investment. The activities of intergovernmental organizations can also sometimes be "hidden in plain sight," due to the low media profiles and diffuse constituencies of organizations themselves. Domestic programs, in contrast, often attract more intense national media attention.

Open Source @ Intergovernmental.Org

Today, F/OSS issues are squarely on the agenda at three important venues in the United Nations system: the UN Development Program and other development-related UN agencies; the World Intellectual Property Organization; and the World Summit on the Information Society. These discussions reflect an increasingly common perception that F/OSS had a role to play in promoting global access to the knowledge economy. The permeability of these institutions to arguments about F/OSS, however, has varied and continues to vary a great deal. UNDP has been both interested and receptive. WSIS has been a site of open contention in regard F/OSS inclusion in discussions about the future of the information society. WIPO has been subject to a slow but increasingly active campaign to reorient it around development-friendly IP policies,

including the preservation and promotion of the unique IP arrangements that sustain F/OSS.

To date, these debates have been mainly educational and symbolic, limited to official meetings and published reports. Many of the state actors and advocacy groups involved in this process, however, believe that the effort alone has performed an important legitimizing and networking function, expanding the open source community and shifting the balance of calculations toward F/OSS in many countries. (See the FOSSFA contribution to this report for the example of Kenya.)

United Nations Development-Related Agencies

The United Nations family of organizations is highly decentralized and diverse in its functions, making generalizations about software policy difficult. However, a number of UN organizations are becoming active in open source matters and it seems likely that the UN, in general, can become a significant force in this area. At present, four agencies are leading the way: the UN Development Program (UNDP), the UN Conference on Trade and Development (UNCTAD), the UN Educational, Scientific and Cultural Organization (UNESCO), and the UN Economic Commission for Africa (UNECA).

UN Development Program (UNDP)

The UNDP is the lead UN agency responsible for development issues, with offices in over 160 countries. The agency relies on "local capacity" for its projects, which focus on poverty reduction, crisis management, the environment, health, and the promotion of democratic governance. It has invested heavily in Internet access in poor countries and supported a number of efforts to develop policy models for the development of IT infrastructure. Since 2002, UNDP has shown growing interest in integrating F/OSS into its digital agenda. In 2003, UNDP created a subsidiary agency to promote F/OSS in the Asia Pacific region, called the International Open Source Network (IOSN, launched formally in 2004) (Wong, 2003).

IOSN is not a program agency like UNDP, but rather a networking organization designed to enable local, independent contributors to collaborate. Primarily, it serves as a clearinghouse for information about open source activities in the region, offering an online portal for information about open source projects, a technical mailing list, a software repository, and a database of programmers. It also hosts conferences and training workshops, and plans to establish a small grant program to support open source initiatives (offering between $500 and $10,000 for work on language and font localization, among other things). Until it finds a permanent home, IOSN is managed by the UNDP's Asia Pacific Development Information Program in Kuala Lumpur, Malaysia. If successful, it is intended to serve as a template for efforts in other regions.

Education and dissemination efforts—especially directed at policymakers—figure prominently in its work. In February 2004, the IOSN organized brought together over 50 officials from 20 countries in the Asia-Pacific to discuss F/OSS adoption, resulting in a "findings" document that called for increased use of F/OSS solutions. This was followed by a comprehensive report intended to promote open source among regional officials. Other activities are geared toward broader populations: In 2004, IOSN released a Linux desktop manual aimed at inexperienced computer users in the Asia-Pacific region. It also sponsored "Software Freedom Day" (August 28), with events held across Asia intended to demonstrate and encourage the use of open source.

UN Conference on Trade and Development (UNCTAD)

Founded in 1964 and based in Geneva, UNCTAD provides a forum for intergovernmental discussions, conducts research and policy analysis, and provides technical assistance to developing countries. Where the UNDP focuses mostly on local initiatives, UNCTAD deals more with government officials. UNCTAD has no local offices, and so in certain situations relies on the UNDP to support its activities.

UNCTAD's uptake of F/OSS suggests the speed with which open source has become a major issue for governments, as well as the political sensitivities surrounding it. In 2002, UNCTAD issued a report that included a brief mention and neutral appraisal of F/OSS. In 2003, the organization's annual E-Commerce and Development Report dedicated an entire chapter to the merits of open source.[54] In September 2004, UNCTAD organized a high-level conference on open source, which emphasized the benefits of state-based F/OSS adoption. This was also an occasion for some public discussion of the broader role the UN should play in encouraging open source.[55] UNCTAD and UNDP have the potential to be complementary forces in promoting open source adoption, pushing simultaneously from the grass-roots (UNDP) and at the level of policy elites.

UN Educational, Scientific and Cultural Organization (UNESCO)

Once devoted primarily to scholarly exchange and heritage preservation, UNESCO has developed programmatic interests in information technology as it tries to adapt to new forms of knowledge production and cultural change. UNESCO sees itself as the UN body most responsible for the "soft issues" of the information society—culture, identity, education, knowledge—as distinct from "hard issues" like the technical standards managed by the International Telecommunication Union. UNESCO has sought to play a role in the WSIS process on these terms.

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[54] UNCTAD 2003. Cf. UNCTAD 2002. A typical passage is: "…it is important to explore the opportunities provided by the availability of free software founded on, among other things, Linux-based platforms."(page 32).
[55] UNCTAD Expert Meeting on Free and Open Source Software, September 22-24, 2004; Palais des Nations, Geneva. The interest of UN agencies to consider an open source agenda is demonstrated in Calovski.

F/OSS advocacy is part of this agenda. In 2001, UNESCO launched an online information portal focusing on open source adoption. It includes links to news, initiatives, developer documentation, case studies, and a bibliography, among other things. UNESCO also makes available some open source software, especially in the area of information retrieval and digital archives. Additionally, the organization has hosted workshops on F/OSS in Latin America and Africa, and a joint meeting Paris in 2003 with UNDP. Future plans include expansion of the portal into a number of additional languages.[56]

UN Economic Commission for Africa (UNECA)

UNECA is one of five regional commissions of the UN, and is charged primarily with supporting the economic and social development of the 53 member states in the region. UNECA's main contribution to the open source debate is the creation (in 2003) of FOSSFA, the Free Software and Open Source Foundation for Africa, and the subsequent support of FOSSFA's African action plan. The ground work for FOSSFA was laid in November 2002 at the UNECA-hosted ICT Policy and Civil Society Workshop, (organized by the Association for Progressive Communications, a civil society group). FOSSFA was formally established six months later, at the second preparatory meeting for the WSIS summit in Geneva.

FOSSFA has engaged in a range of lobbying activities with African governments for recognition and consideration of ICT policies favorable to open source. More generally, they serve as an information resource for open source development and activism in Africa. (These activities are described in greater detail in FOSSFA's contribution to this report.)

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[56] UNESCO's Free Software Portal, in English, is at: http://portal.unesco.org/ci/en/ev.php-URL_ID=12034&URL_DO=DO_TOPIC&URL_SECTION=201.html

World Intellectual Property Organization (WIPO)

WIPO develops and administers international treaties governing global standards for intellectual property rights, including patents, copyrights, trademarks, geographical indicators and other instruments. Originally an independent IP treaty organization, it became part of the UN system in 1974. WIPO has traditionally understood its mission as that of raising levels of protection for intellectual property, and of harmonizing national laws around global standards. Because of this orientation, WIPO has viewed its primary constituency as the owners of intellectual property who make use of the treaties—especially large corporations and professional associations.

As IP became an increasingly explicit part of the global trade architecture in the late 1990s, WIPO came under increased scrutiny from civil society actors and from a growing number of assertive, well-organized developing country representatives. This loose alliance has worked to question the assumption that high levels of IP protection are a prerequisite for economic development, and more generally to open WIPO deliberations to a broader spectrum of views. Open source methods have emerged as an emblem of this challenge to business as usual—in part because of F/OSS's creative use of copyright and other IP provisions. (F/OSS's licensing innovations derive from, but also part ways with, conventional IP norms—especially under the stricter 'viral' requirements of the GPL. (See Jennifer Urban's contribution to this report.) This alternative view of intellectual property—as precluding rather than requiring control—is largely incompatible with WIPO's traditional concerns.

In July 2003, some 60 high-profile legal scholars, activists, economists and technologists wrote WIPO Director General Kamil Idris to request that the organization host a meeting on open source approaches to intellectual property (Asher, 2003; Butler 2003). WIPO agreed to do so. This gesture drew complaints from the US Patent and Trademark Office and from trade groups representing proprietary software firms,

and WIPO soon rescinded its decision (Krim, 2003). The cancellation, in turn, generated an outcry in the open source community and in the larger NGO community working for WIPO reform (Lessig, 2003). WIPO looked weak-willed, and the US government looked like it was taking directions from Microsoft.

A little over a year later, F/OSS issues were again on the agenda, though framed within a larger argument about the responsibility of WIPO to the development needs of poor countries. Civil society groups—notably the Consumer Project on Technology—and an alliance of developing countries played the central role in creating this opening. In the fall 2004 WIPO General Assembly, delegates took up and ultimately passed a "Proposal by Argentina and Brazil for the Establishment of a Development Agenda for WIPO," which calls for formal exploration of the benefits of "open source software" as part of a broader reorientation of IP treaties to address development needs (WIPO, 2004). The meeting also saw a move to accredit more non-governmental organizations to participate in WIPO processes. Among the civil society groups to be accredited with "observer status" were the Electronic Freedom Foundation and the Free Software Foundation Europe, both major forces in open source development and adoption.

UN World Summit on the Information Society (WSIS)

WSIS is a multi-year series of events intended to explore (and develop plans for addressing) major challenges of global inclusion in the information society. The event is organized by the International Telecommunication Union (ITU), the world's oldest existing treaty organization (founded in 1865 when the T stood for "Telegraph"). The first event was held in Geneva in December 2003; the second and final WSIS event will be hosted in Tunisia in November 2005. The emphasis on inclusion raised expectations that the ITU would reach out to new constituencies—especially civil society actors. The ITU's ultimate reluctance to integrate such participation drew widespread criticism.

Until the liberalization of the telecom sector in the 1980s and 1990s, the ITU was primarily a government-backed cartel of the major telecom carriers, with a record of restraining innovation in telecommunications that came from outside the traditional telecom carriers. ITU standards were closed in two respects—procedurally, in the sense that standards were developed by national telecom carriers who enjoyed indirect representation at the ITU; and proprietarily, in that implementation of the standards required the payment of an expensive fee.

The Internet, in contrast, evolved around a more consensual, private-sector based, market-oriented approach to standards. The main Internet standards-setting body, the Internet Engineering Task Force, has no government-affiliation. The ITU was unprepared to deal with standard setting that occurred outside a government-sanctioned process, and as a consequence was largely sidelined from Internet development. Pressure to change grew as telecom carriers recognized that the Internet would prevail over and eventually subsume ITU-derived standards (such as the ITU's X.25 standard, on which France's Minitel system was based). The major "open" Internet standards were not formally recognized by the ITU until 1998. Today, the ITU has changed its practices considerably, and makes its standards through a far more open process, on terms that make them less costly to adopt.

At the first WSIS meetings, three issues proved highly contentious: Internet governance (i.e. managing the domain name system); the funding of digital divide initiatives; and intellectual property—specifically in relation to F/OSS. Throughout the preparatory meetings ("PrepComs") in 2002 and 2003, open source software was a critical stumbling block. Developing nations, led by Brazil, India, South Africa and China, insisted that the two formal documents of the summit, the "Declaration of Principles" and the "Plan of Action" contain positive references to F/OSS (Shenker, 2003). Much of this work took the form of comments offered during public deliberations and proposed wording changes to the agenda documents. Alliances with smaller developing

nations also played a role in reinforcing F/OSS-friendly positions—Cuba and Vietnam each spoke out in favor of F/OSS at these PrepComs. Here Brazil, India, South Africa, and China reprised their role as an informal "block" of industrializing regional powers, capable of mobilizing alternatives to aspects of the U.S. and European-led development agendas. (Other recent intergovernmental forums have split along similar lines, most significantly the Cancun trade talks in the autumn of 2003.)

Once again, the US acted as a de facto representative of proprietary software interests, and sought to eliminate or dilute references to F/OSS. After the PrepCom II meeting in March 2003, the US government issued a formal comment stating that open source is only one model of software development and should not be privileged relative to proprietary software.[57] Following PrepCom III in September 2003, developing countries and civil society groups remained at odds with the developed world on open source software, but Ecuador, Argentina and Mexico had softened their pro-open-source stance. Meanwhile, the European Union favored a neutral approach[58]

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[57] USA. The section reads: "The United States recognizes that open source software can contribute to increased access and diversity of choice but it is only one of many possible models for the development of software. The WSIS documents should not promote one over the other (i.e. open source vs. proprietary), but should instead foster the availability of diverse alternatives and the freedom to choose among those alternatives."

[58] This come from a report by the International Chamber of Commerce, which served as the lead business representative to the WSIS process, with strong participation by the U.S. Council for International Business. See CCBI. The section reads in full: "Software choice – Some countries want to express a preference for the Open Source software development model as opposed to letting the market decide. Civil Society is also pushing an agenda that all software should be available free without cost. There is a misunderstanding that pervades regarding 'free software' and whether it is truly free of cost. There continues to be a split between developed and developing countries on this issue. However, some progress was made with a few developing countries such as Ecuador, Argentina and Mexico. The EU also spoke in

Negotiations over intellectual property were time-consuming and tense, according to intergovernmental delegates who attended the closed sessions. Brazil and the US remained divided and the impasse was broken only when the parties agreed that WIPO, not WSIS, was the appropriate forum for the debate. The compromise denied both sides what they wanted. Brazil was denied stronger wording in favor of open source. The US was denied language indicating that countries must respect existing intellectual property treaties. In the end, the Declaration of Principles contains no references to "open source" and only one reference to "free software"; the Plan of Action uses the term "free software" twice and "open source" once (WSIS 2003). The Plan is written in so vague a fashion that all sides can find in it support for their positions.

The Empire Strikes Back: Reaction by States and Software Firms

The hard US line on open source is widely interpreted as a reflection of Microsoft's lobbying power, and behind it the broader, US-dominated proprietary software industry. Much of this lobbying occurs through surrogate trade associations, such as the Initiative for Software Choice, the International Intellectual Property Alliance, and the Business Software Alliance. These organizations are closely connected to the office of the U.S. Trade Representative, and several are accredited observers at WIPO. Responsibility for scuttling the first planned WIPO meeting on open source, for example, is usually attributed to the Business Software Alliance, which played the leading role in applying pressure on the US Patent and Trademark Office (Krim, 2003).

In other settings, Microsoft has adopted a more constructive strategy of engaging UN development initiatives. In January 2004, one month after WSIS, Microsoft and the UNDP announced a technology partnership involving financial and software support for IT projects in the developing world, with a special emphasis on Africa. FOSSFA warned against this cooperative

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favour of technology neutrality."

agreement, arguing that it limits UN agency options on open source. In November 2004, Microsoft and UNESCO announced a similar alliance aimed at IT training for teachers and students in developing countries. These agreements supplement the increasingly common Microsoft practice of lowering the price of Windows when it competes against Linux for government contracts—a practice subsidized in some instances by Microsoft's "Education and Government Incentive Program" (Fuller, 2003).

At WSIS, Microsoft lobbied hard for the US to include language in the final documents that called for the adherence to existing intellectual property conventions. Their reasoning was that WSIS recognition of "rights" of access to information technology, communications and expression might promote a view of software as a kind of public right or national security interest. International endorsement of such a view—even in non-binding documents such the WSIS agenda—could open the door to government F/OSS mandates or compulsory licenses, akin to the use, by Brazil and other countries, of compulsory-licensing threats against manufacturers of patented HIV/AIDS drugs[59]

The close connection between US diplomacy and American corporate interests are nothing new. However, WSIS marks one of its most conspicuous instances in the technology sector. The ability of the open source community to rebuff the actions of "MSUSA" will be a test of its capacity to organize and lobby effectively. As the second round of WSIS approaches, these struggles are likely to intensify.

Conclusion: The Value of Intergovernmental Forums for Open Source

These different processes of institutional uptake suggest a number of general points about IGO engagement with F/OSS. First, we can note a difference in the source of IGO interest. For

UNDP, UNCTAD, and other agencies, F/OSS involvement is primarily the product of informal member politics and the efforts of a handful of agency officials; there are no recorded votes by member states to pursue these initiatives (though there is tacit support for them). In other cases, notably WIPO and WSIS, the F/OSS debates are reflective of formal diplomatic requests by member states. These have been the sites of greatest tension on these issues.

WIPO and WSIS are significant for being "agenda" cases. F/OSS debates within these forums reflect struggles to define institutional agendas and long-range mission statements. The process of setting these agendas is formalized and state actors are usually the only official participants (though NGOs, professional associations, and other ideologically-motivated actors play supporting roles). In contrast, other UN agency F/OSS investments are project-oriented, and mobilized by small numbers of actors. In these settings, F/OSS doesn't raise fundamental mission concerns.

In a number of cases, government actors use international organizations to advance F/OSS agendas in ways that would be difficult to achieve domestically. Multilateral settings present different opportunities and constraints than national discussions involving propriety software firms. For example, France's interest in adopting F/OSS is strong in many parts of the government (for example, in units working on e-commerce), but is blocked by officials who work on broad national economic issues (notably the Finance Ministry), where proprietary software firms are able to lobby more effectively. At the same time, conditions are different and potentially more favorable at the local level, as recent consideration of F/OSS by the city of Paris suggests, and also at the international level: pro-F/OSS French officials have worked through the European Union to promote a wider set of F/OSS-friendly norms and policies.

In some cases, these moves are examples of "forum shifting"—the strategic use of overlapping policy jurisdictions to circumvent political opposition. Many IGOs are well-suited to this purpose because of their relative isolation from public scrutiny and accountability. Policies

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[59] Selian and Cukier; based on private conversation with Microsoft official.

developed at the international level can be used to advance more binding policies within states. One well-known but failed example was the American attempt to use the Organization for Economic Cooperation and Development to promote strict cryptography regulation (related to key-escrow accounts) in the 1990s—a measure that could not be passed domestically. More successful efforts include the integration, by corporate advocates, of IP responsibilities into the World Trade Organization, which unlike WIPO can enforce its provisions. As the IGO debates attest, F/OSS advocates have learned from these examples.

It is still too early to judge the impact or eventual scope of F/OSS activities within the IGOs. UNECA's work has been a catalyst for some F/OSS coordination and policy awareness in Africa. The UNDP's IOSN network in Asia is innovative but embryonic. The more significant impact may be the legitimizing function that IGO F/OSS activities have in developing countries, which tend to look to UN bodies for guidance on policy matters. The UN organizations play a role in "branding" open source approaches as viable in developing-country settings, and—in this case—in bridging formerly separate policy areas of software procurement and development.

Yet IGO involvement in promoting F/OSS comes with potential drawbacks: the border between market-based adoption and public provisioning of basic software infrastructures is controversial, including within the F/OSS community. The issue is not simply one of choice between competing technical solutions, but of choosing between divergent economic models of software development and sales. Ultimately, as the WSIS and WIPO debates have shown, IGO debates will tend to shift toward the political rationales for open source, and emphasize differences in member-government philosophies regarding the role of public policy in the economy. Technical discussions about F/OSS have relatively little purchase in this context.

At WSIS, some civil society groups pushed for the recognition of F/OSS as a matter of human rights, in the sense of a right of access to the

basic infrastructures that permit inclusion in the information society. Other politically-grounded defenses of F/OSS emphasize the way its participatory, decentralized character supports the non-corporate, technical evolution of the tools of the information society. From both of these perspectives, software is a basic social infrastructure with strong claims on public provisioning. The politicization of F/OSS at the national and IGO levels is, in this context, necessary and inevitable as actors work to define new forms of public goods appropriate to the information society.

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FOSSFA IN AFRICA: OPENING THE DOOR TO STATE ICT DEVELOPMENT AGENDAS—A KENYA CASE STUDY

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In Africa, information and communication technologies (ICTs) play a central role in 'leapfrogging' models of development, characterized especially by efforts to skip a generation of expensive infrastructural investment in the communications sector. Wireless technologies—most notably cellular phones and internet access—are the most common representatives of leapfrogging ambitions. In the eyes of many African F/OSS advocates, the licensing, localization, and local skill-building advantages of F/OSS offer a natural fit with this technological agenda—and with development agendas more broadly. F/OSS provides an updated answer to long-running tensions between modernization and autonomy, and a hedge against one important area of technological dependency and outflow of resources.

Meaningful F/OSS penetration, however, has not been achieved, even among the local ICT actors who might be expected to benefit most from it. This failure is difficult to dissociate from the larger failure of African states to implement sustainable ICT development policies, but it has a number of specific characteristics that F/OSS advocates need to address. F/OSS advocacy can be more effective, and in becoming so can shape state ICT development efforts.

Using a case study of Kenyan ICT policy, this paper will explore some of the socio-political considerations affect the advocacy and implementation of F/OSS solutions in Africa. The case study will outline experiences from the Free Software and Open Source Software Foundation for Africa (FOSSFA) in advocating for policy change and the inclusion of F/OSS in Kenyan ICT policy. Although F/OSS has achieved wider acceptance in countries such as South Africa and Tunisia (an ICT and Free Software Ministerial position was recently created in Tunisia), Kenya is more representative of the economic and socio-political problems facing F/OSS adoption in most of the African States.

More specifically this paper will:

- Describe the structure of competition and local entrepreneurship in Africa's ICT sector, and the continuing importance of state ICT initiatives.

- Outline FOSSFA's experiences in obtaining state-level political commitments toward F/OSS.

- Highlight the importance of alliance building (locally and internationally) in securing government attention to F/OSS opportunities. This includes especially the involvement of donors, the civil society organizations and the private sector.

The Economic and Political Dynamics of the African ICT Sector

The African ICT sector, like those of other underdeveloped regions, is shaped by a widespread set of economic and political problems. Lack of resources and ICT skills, poor educational systems, lack of government commitment to local ICT producers and the widespread worship of products from the west figure prominently—and usually negatively—in the development of local ICT capacities. In spite of programs of economic liberalization—including that of national telecom sectors—state regulation and state contracts remain powerful determinants of the direction of ICT deployment. The legacy of centralized control over telecom and communications services and the lack of meaningful competition in bidding for contracts has recreated monopoly conditions

in many areas of ICT development, in many countries. The new de facto and sometimes de jure private monopolies are often tied to multinational corporations and proprietary technologies. In a small ICT sector, these preferential relationships crowd out and sometimes force out independent ICT development, and increase the cost of information goods and services.

In the software arena, proprietary firms still dominate this dynamic. For the large F/OSS based multinational companies, Africa is a very small market, contributing only about 1% of their gross revenues. Multinational software giants like IBM, Sun, Novell, Suse and others generally do not treat Africa as a separate market, preferring to group it together with Europe. Although Africa lags seriously behind both developed countries and other developing regions in terms of ICT penetration and use, ICT infrastructures have expanded rapidly in the past several years. Africa had the highest rates of growth for Internet use of any region in 2002 and 2003 (63% and 21% respectively), nearly tripling the number of Internet users between 2000 and 2003. (UNCTAD's e-Commerce and Development Report, 2004). Growth rates in developed countries, in contrast, have flattened—15% in 2002, 2% in 2003.

Africa's ICT industry is characterized by a mix of small scale local businesses and distribution channel partners for large multinational companies. The latter generally have little interest in local capacity building per se. Small scale businesses work to develop local software but often face an unequal playing field. Multinational distribution channel partners generally lobby very effectively with governments to ensure their primacy or complete control of public sector initiatives. This typically cuts out the local software developers, and underwrites a pattern of instability for independent initiatives. Complete reliance on foreign technologies is the usual result.

High-level corruption in Africa is rampant. Bribes and kickbacks are common within governments at all levels. The multinational partners operate at a huge advantage over

independent locals in this arena, both in terms of the resources they can deploy and in terms of their capacity to strategically undercut local bids. This is evident from some recent Government initiative to partner with proprietary vendors in the education sector and agreeing to expose pupils and students to a single proprietary vendor product. This has the effect of creating a community of users at the National level with minimal effort directed to creating capacity for local software developers. FOSSFA has noted some Government tenders clearly stipulating that they require certain proprietary vendor products yet there are better and cheaper open source alternatives. Under these circumstances, sustained local ICT development is all but impossible. F/OSS advocacy, in this context, is inevitably tied to political reforms in contracting, public services, and competition policy.

The Kenyan Case: Background

FOSSFA's efforts to create a space for F/OSS within Kenyan ICT policy had to be sensitive to the particular Kenyan version of these dynamics. Kenya's post-independence political history has seen a number of major efforts at political reform, infrastructural development, and social inclusion, ranging from early projects of decolonization, to efforts at state-led social integration and modernization, to the recent IMF and World Bank sponsored economic 'liberalization' of the 1990s. These have had mixed success at best at addressing the major challenges of Kenyan society, such as the social integration of more than 70 tribal groups, the sharpening of development inequalities between rural and urban settings, and the entrenched dominance and corruption of the public sector in Kenyan life.

Despite the liberalization agenda, Kenya has lagged behind the leading African states in ICT adoption. In part, this is a function of having missed out on earlier telecommunications developments, on which the new ICTs have depended. Kenya has 327,000 landlines in a population of over 30 million, giving it a teledensity of 1%, 23rd in Africa. Kenya is estimated to have 1.4 million internet users with about 95% of these users located in the two major cities, Nairobi and Mombasa. Although

there are many challenges facing ICT adoption in poor countries, Kenya has significantly underperformed its potential. Political corruption and flawed (and poorly implemented) policies bear much of the blame.

Although the situation looked gloomy, the election of a new government in 2002 provided some reason to hope for a reopening of the discussion about ICTs and development. As one of its first collective acts, FOSSFA members decided to press this opportunity. FOSSFA appreciated that it would be pointless to talk about F/OSS adoption in the absence of a broader discussion about competition policy and gaps in basic ICT infrastructure—especially bandwidth, connectivity, electricity, and accessibility. FOSSFA thus developed an advocacy plan that targeted a broader framework of social and economic needs, grounded in the expansion of participation in:

- telecommunications
- private sector local entrepreneurship and competition.

Telecommunications

The opportunity to engage Kenyan ICT policy emerged in part through unforeseeable political contingencies—most notably a shakeup of the new cabinet, which brought information and communication functions together under a former ICT professional with excellent industry credentials, Hon Raphael Tuju. Tuju has clearly signaled the need for ICT reform, and been responsive to a wider range of civil society participation in discussions of ICT policy. Collective pressure by the Telecommunications Service Providers Association of Kenya (TESPOK), The Kenya Private Sector Alliance, FOSSFA and other ICT stakeholders, for example, has prompted the implementation of a new, more flexible, licensing framework for providers of communication services. In particular the strategy has allowed cellular mobile operators (GSM) to construct and operate their own international gateways, as well as the liberalization of VSAT (Very Small Aperture Terminal) services, clearing away previous restrictions on satellite communications. The new licenses even allow

telecom operators to carry voice traffic over the internet (VoIP).

Kenya's telecommunications sector has long been dominated by a state monopoly granted to a single provider (Telkom Kenya).By eliminating competition and restricting entry to the market, the government crippled the growth of communications services and infrastructure. In 2001, the Kenyan Government permitted a limited form of competition in the cell phone market, which led to the creation of two mobile providers (KenCell and Safaricom). Within 3 years the number of cell phone users mushroomed to 2.8 million.

In keeping with the 1998 Telecommunications Act and the subsequent 1999 Communications Sector Policy, Telkom Kenya's monopoly ended in June, 2004. Efforts to license a second national operator to compete with Telkom Kenya are underway. As a start, the Kenyan government will liberalize the ICT sector by licensing a second national landline operator, a third mobile provider and 4 additional internet backbone providers. Though the market for internet providers is currently quite competitive, with a stream of new entrants, the broader ISP sector was hobbled by the fact that Kenya had only one internet backbone. With the new licensing scheme, new entrants to the backbone market have appeared, including the multinational provider, UUNET.

Private Sector Support

As in other contexts, F/OSS adoption is meaningless without the commercial and social infrastructure to sustain it. In Africa, building these conditions is a significant task in itself. Like many other advocacy groups working in underdeveloped settings, FOSSFA believes that sustainability requires the creation of F/OSS-related employment and business opportunities. Africa is arguably distinctive in the degree to which this requires intervening with the state, whether to reduce barriers to entry for local software providers or to promote related areas of local ICT entrepreneurship.

F/OSS-based companies are beginning to emerge in Africa, and with them, the support

and training capacity for broader F/OSS adoption. Examples include Obsidian (www.obsidian.co.za) in South Africa, Circuits & Packets Communications Ltd (www.circuitspackets.com) in Kenya and Linux Solutions in Uganda (www.linuxsolutions.co.ug). In order for these companies and others of similar nature to succeed, FOSSFA realized there is a need to work together with governments and donors to fight for an equal opportunity for all in the ICT industry.

Alliance Building

Because the role of software in ICT planning is poorly understood within most African governments, and because F/OSS has such limited visibility even within this narrower field of policy action, FOSSFA has worked assiduously to build alliances with groups interested in related questions of ICT development. These included potential commercial entrants in the telecom sector, UN agencies, international donors, African and international civil society groups, and a variety of other local and regional actors.

The first priority was to raise the visibility of F/OSS within Kenyan ICT policy discussions. Because the available venues for such an effort within Kenya were limited, FOSSFA decided to build momentum for national F/OSS policy through the inclusion of Kenyan voices in international discussions of F/OSS, ICTs and development.

The World Summit on the Information Society (WSIS) provided such an opportunity: FOSSFA teamed with the African Civil Society Caucus and other Civil Society Organizations (CSOs) to form a stakeholders forum—the Kenya WSIS Civil Society Caucus. By participating in the international forum, the Caucus acquired visibility and legitimacy as a national participant in ICT policy discussions. On this basis, it began lobbying for the inclusion of F/OSS in national ICT policy.

For practical and strategic reasons, this process turned on the critical evaluation of Kenyan ICT policy within the broader WSIS framework. Within the Civil Society Caucus, considerable

work was done to find collective positions on the wide range of WSIS issues, including not only F/OSS, but also gender equity, issues relating to persons with disabilities, and a number of other concerns. As this work progressed, it provided an internationally-developed and sanctioned platform for evaluating Kenyan ICT policy on the basis of a number of social and economic criteria: industry structure, global competitiveness, locally developed ICT content and solutions, intellectual property rights and knowledge transfer, and the improvement of ICT literacy, among others.

Alliance building with the donor community also played an important role. Donors with long histories of involvement in ICT development in Africa, such as IDRC and Association for Progressive Communication (APC), hosted several workshops for ICT stakeholders, helping to raise the visibility of F/OSS and related ICT concerns. The results of these workshops formed the basis of FOSSFA's revisions to Kenyan ICT policy.

This approach was partially validated by the creation of the Kenya ICT Consultative Team (KICT), formed through the invitation of the Minister of State in the Office of the President. The team, consisting of donor agency representatives from IDRC and USAID, members of The Kenya ICT Federation, Kenyan academic institutions, and the Kenya WSIS caucus were charged with developing a set of recommendations to the Minister on ICT policy. Here, F/OSS made its debut as an explicit priority for Kenyan ICT development.

With the adoption of F/OSS in the National ICT policy, FOSSFA continued to lobby for change in the Government Procuring Procedures and ensure equal opportunity for all. This led to the establishment of the Government Information Technology and Management (GITIM) Framework which stipulates clearly that Open Source and Open Standards shall be given preference to closed and proprietary solutions. The Government Procurement Framework has also made it clear that locally available alternatives shall be given preference to foreign products. This framework

will, in turn, define Government procurement guidelines in the ICT sector.

FOSSFA's role in Kenya has now shifted slightly to that of a watchdog, making sure the Government lives to its promises. FOSSFA members are actively involved in the tendering processes and some positive results are being seen. Still, much needs to be done and the struggle continues.

Conclusion

FOSSFA's successes in Kenya stem from the recognition that software alone is not a solution to development needs—at least under the conditions prevalent in many African countries. A wide range of related social, economic, and political infrastructures must be addressed at the same time. In this context, broad-based alliances are a condition of success, not only as a way of linking mutually-dependent issues, but as a way of speaking more effectively in contexts where the channels of communication between civil society and government are historically narrow.

Two other factors affected FOSSFA's work in this area—the utility of international venues such as WSIS in providing an organizing and legitimating framework for national efforts, and the fortunate circumstances that brought a sympathetic ear into government at the right moment for that work to be effective.

F/OSS ADOPTION IN BRAZIL: THE GROWTH OF A NATIONAL STRATEGY

Eugene Kim

When Luis Inacio Lula da Silva became president of Brazil in 2003, industrialized nations looked on with some trepidation. The former union organizer was Brazil's first left-wing leader in 40 years, and many in the international business community wondered how his politics would affect the country's large, but precarious economy. Brazil boasted the world's 15th largest economy with a GDP of $493 billion, but its GDP per capita was $7,900, 94th in the world (Cadina, 2004; World Factbook, 2004). Its national debt was $250 billion ("What Will Lula Do?," 2002). Forty percent of all workers were paid less than minimum wage ($223.26 per month), and less than two percent made more than $1,489 per month. Only 10 percent of its 170 million citizens owned computers (Clendenning, 2003).

Lula assuaged some of the financial concerns over his leftist leanings by practicing fiscal discipline, cutting federal spending even at the expense of some traditional left-wing programs (Mitchell, 2004). In keeping with this policy, he announced in late 2003 that the federal government would look to migrate to free and open source software (F/OSS) on a broad scale. On the surface, this decision was a simple cost cutting measure. According to Brazil's Instituto Nacional de Tecnologia (INT), Brazilians spent $1.1 billion every year on software licensing fees, and the federal government was the nation's biggest customer ("Open source could," 2004). While the average computer cost R$1,200, the cost of Microsoft Windows and Office was R$2,000 (Haffenreffer, 2003). The government accounted for six percent of Microsoft's 2003 Brazilian revenues of $318 million (Epstein, 2004). Switching to F/OSS would save millions of dollars.

The decision was bold and controversial. Open source software had long fought the stigma of being less polished than its proprietary counterpart. Although open source software had matured considerably and corporate adoption had grown steadily over the previous decade, Brazilian versions of these tools were still in their infancy. Additionally, the model of open source software development was (and is) still not widely understood. Entrusting a country's IT infrastructure to a decentralized process that lacked an obvious sustainability model required tremendous faith in emergence and the grassroots. The decision to migrate to open source software on a national scale was not simply a matter of choosing one product over another. It was a political decision that validated open source software as a movement.

What were the circumstances that led to this decision? The desire to cut costs was the most obvious, but not the sole motivation. In many ways, open source was the technological parallel to the grassroots political movement that had thrust Lula into his country's top office. It was a way to make technology more accessible to the people at large, and as such could help close the digital divide and improve living conditions for Brazil's many poor workers. This report explores these political circumstances in greater detail by examining Brazil's social and technological history.

Software and Nationalism

The decision to migrate from proprietary to F/OSS at the national level drew much of its inspiration, political strength, and technical expertise from a number of municipal F/OSS initiatives already underway. Most of these municipalities were strongholds of Lula's political party, Partidos dos Trabalhadores (PT),

or Workers' Party. The PT's interest in F/OSS had a strong economic rationale: the zero licensing costs fit well with the party's agenda of expanding access to information technology among the poor. But there were other affinities as well. In some important respects, the grassroots nature of the F/OSS movement bore a resemblance to the structure and origins of the PT. This made it possible for some actors within the PT to make the case for F/OSS as an extension of PT values and as an eventual cornerstone of PT technology policy. This activism within the PT eventually enabled the national-level embrace of F/OSS.

Founded by Lula and others in 1980, the PT was a grassroots party in every sense of the word, consisting of a loose coalition of union members, Catholics (mostly members of a parallel religious grassroots movement known as Communidades Ecclesiasticas de Base, or CEBs), and the middle class (Fausto 307, 1999). None of the founding members were politicians; in fact politicians were excluded from the party at first (Hudson 285, 1998). Although it was socialist in orientation, PT ideology was far from unified. Lula was part of a moderate faction known as Articulacao, which held a majority in the party for much of the next two decades, and he spent much of his time strengthening the coalition (Hudson 386, 1998). Lula ran for president in 1989, 1994, and 1998, before winning in 2002. Although many aspects of PT politics had become more professionalized (Lula had exchanged his scruffy, open collar look for a trimmed beard, suit, and tie), the Worker's Party had retained it bottom-up approach to politics, its participatory ethic, and its presumption of outsider status vis à vis national and international capitalism.

Because of this history, Lula and his party were well positioned to appreciate the grassroots model of open source software development and the political implications of its challenge to existing patterns of technology transfer and development. Brazil's history of technology initiatives also offered an important negative example as the PT began to articulate national-level policy agendas. In the early 1980s, Brazil decided to foster its own domestic personal computer industry by isolating itself from the

foreign market. The government established the Market Reserve Policy in 1978, which disallowed imports of foreign goods that competed with domestically-produced offerings and that placed high tariffs on other imports (La Rovere 21, 1992). In some respects, the policy worked. The market for domestic computer hardware grew from $200 million in 1979 to $4 billion in 1990 (Veloso 9, 2003). However, it also left Brazil well behind the worldwide technological growth curve. Brazilian PCs were less sophisticated and more expensive than foreign-made PCs, costing up to five times more. This in turn hurt the country's exports and fostered a black market that accounted for up to half of total PC sales (La Rovere 22, 1992). Moreover, these policies made the increasingly consequential error of ignoring the software industry, viewing software as a mere subsidiary to hardware production (Duarte 84, 2002).

Following the expiration of the Market Reserve Policy in 1992, the government tried to correct its mistakes by investing R$2.9 billion into research and development, a quarter of which was spent on software. In 1996, several major computer companies formed SOFTEX, Brazil's Society for the Promotion of Software Excellence. In addition to its high-level goals of building a world class software industry and fostering Silicon Valley-style entrepreneurship, its main goal was to boost software exports. In this regard, SOFTEX was moderately successful. In 2001, exports totaled $100 million (up from $1 million in 1992) (Veloso 10, 2003). However, Brazil still imported $1 billion more in software than it exported (Alerigi, 2003). The previous decade's policies had given the software industries in other countries a considerable head-start.

The ascendancy of the PT created an opportunity to rethink the relationship between the nationalist agenda of building Brazilian knowledge capacities and the globalization agenda, which saw Brazil increasingly engaged in international markets for technology and knowledge goods. In his inaugural speech on January 1, 2003, Lula signaled his departure from the older import-substitution model of technology development, making it clear that he

did not equate nationalism with isolationism. He explained:

> In my government, Brazil will be at the center of attention. What Brazil needs to do, in all areas, is to plunge within itself in order to create forces to enable it to expand its horizons.
>
> Taking such a plunge does not imply closing doors and windows to the world. Brazil can and must have a development plan that consists, at the same time, of a national and universal approach…. The principal characteristic of the model that we wish to work towards is an expansion of domestic savings and of our own investment capacity. Likewise, Brazil must enhance the status of its human capital by investing in knowledge and technology.

At one level, this signaled an affirmation of the earlier strategy of investment in technology research and development, which had helped create a stable of talented programmers and engineers. The rapid international growth of the Internet in the mid-1990s created new opportunities for Brazilian software companies, and placed them in a position of greater international competitiveness. But the growth of this capacity also allowed, by 2003, for an alternative interpretation of Lula's "nationalist and universal" approach, at least in the field of software production. As Brazilian software capacities increased, some of these talented programmers began to participate in the F/OSS movement.

One of these programmers was Arnaldo Carvalho de Melo, a college student who discovered the Linux operating system in 1995, and who soon became an active contributor (Genoni 12, 2002). Carvalho's initial interest was on Linux's networking code, but he soon began working on Portuguese language support for Linux. Later that year, he and Sandro Nunes Henrique founded Conectiva, a company based in Curitiba, Parana, that created Portuguese and Spanish Linux distributions ("Conectiva," 2004).

Conectiva grew rapidly, and quickly became the leading distributor of Linux in Latin America. In addition to Carvalho, Conectiva employed several other key Linux developers from all over the world.

Other Brazilian programmers became active in other high-profile open source projects—notably the GNOME desktop platform and the OpenOffice application suite—leading to Portuguese versions of these tools. Largely on the basis of these contributions, Brazil became a developing-world leader in open source software development. In 1999, the city of Porto Alegre—a PT stronghold—began hosting the International Free Software Forum, an annual world gathering of F/OSS developers and evangelists.

The growing availability of Portuguese versions of popular open source software made F/OSS, for the first time, a viable alternative to proprietary software. The economic advantage of open source software was no longer theoretical; it could be tested in practice. One of the first to do so was Sergio Amadeu da Silveira, a sociologist at the University of Sao Paolo. Amadeu was from the region where Lula and the PT first rose to prominence, and he had co-authored a 1991 history of the party. A decade later, his interests had shifted toward technology policy. *Digital Exclusion: Misery in the Information Era* warned that the 'digital divide' in access to technology would exacerbate the broader economic divisions between rich and poor. He argued that addressing this wider range of economic ills required a technology policy that made IT more accessible to its citizens (Clendenning, 2003). Here, information technology was seen not primarily as a market, but as a social and economic enabler.

Amadeu had a chance to test his thesis firsthand in 2001, when he led the electronic government initiative for the city of Sao Paolo. One of the projects to emerge from this initiative was the Telecentros, a network of community computer centers built in the poorest neighborhoods in Sao Paolo. Each center had between 10 and 20 computers, an Internet connection, and a library. The computers ran on open source software,

which was estimated to have lowered costs by some 80% compared to proprietary solutions (Greve 92, 2004). Each center was run by community residents, and each offered courses that for local residents. The Telecentros were wildly successful. By 2004, there were 108 centers in Sao Paolo, offering a total of 85,000 courses and regularly catering to 370,000 residents (Cadina, 2004). Despite being located in neighborhoods with high crime rates, the majority of these centers did not have guards, and only five had been broken into—three before they opened. Residents tended to protect their Telecentros, because they were seen as important parts of the community (Greve 92, 2004).

The Telecentros helped bolster the political fortunes of F/OSS. Other grassroots efforts also contributed: In 2000, the state of Pernambuco passed the world's first law requiring the use of F/OSS in state offices (Epstein, 2004). The municipalities of Belo Horizonte and Porto Alegre soon followed suit with their own initiatives to convert their offices to Linux (Goertzel, 2002; "Porto," 2003). These initiatives created a base of support for F/OSS that proved able to pressure on the national government on issues of technology policy. In 2001, the federal government finished the specifications for the installation of 290,000 computers in 13,000 public schools nationwide — all to be equipped with Microsoft Windows. Academics and the PT protested vigorously, and eventually won the inclusion of Linux as a listed alternative ("Brazil," 2001).

On reaching office, Lula appointed Amadeu as president of the Instituto Nacional de Tecnologia, which made him the top technology officer in the government. Amadeu quickly made open source software the centerpiece of his national technology strategy. On announcing the government's decision to adopt open source software, Amadeu stated, "We are not opting for a product, we are opting for a software-use development model. This is a political decision, and I cannot emphasize this enough, based on an economic reason -- a reduction in the remittance of royalties. It also expands Brazil's technological autonomy and strengthens our collective intelligence" (Cadina, 2004).

Conclusion

This declaration did not immediately change the facts on the ground, but rather began a process of investigating transition paths and shifting incentives. In October 2004, the government announced that it had spent R$768,000 on open source software, a savings of R$24 million over the equivalent proprietary licenses from the previous year. The government also announced that 68% of federal organizations had begun exploring open source adoption in some form ("Government," 2004). Programs of grants and tax abatements have also been developed to encourage nation-wide adoption of open source, not just within government agencies but also in the private sector ("Open source forum," 2004). These efforts helped forge an important alliance with SOFTEX, the main representative of the Brazilian software industry, which announced its support for the government's F/OSS initiative. Mario Girao, president of SOFTEX, got on board by stating that F/OSS was the best way for Brazilian software companies to compete with foreign companies like Microsoft (Luiz, 2004). By October 2004, mid-sized and large companies had invested 38.5% of their total IT budgets on open source solutions, and 78% of Brazil's largest companies had adopted at least one open source solution ("Study," 2004). The government's new policy also drew support from IBM, which pledged $1 million to help build a new center in Brazil (CDTC) for promoting and developing open source software ("IBM," 2004).

As F/OSS becomes a national policy issue, it also becomes the subject of more traditional forms of political contestation. One of F/OSS's earliest strongholds was the state of Rio Grande do Sul and its capital, Porto Alegre, both of which were controlled by the PT between 1998 and 2002 ("Unisinos," 2004). Porto Alegre's F/OSS mandate was unambiguously a PT achievement. The 2003 PT victory at the national level, however, was accompanied by the loss of Rio Grande do Sul to the Brazilian Social Democratic Party (PSDB) ("Open source forum," 2004). In 2004, the Liberal Front Party (PFL) challenged the constitutionality of the state F/OSS mandate, on the grounds that it did not give equal opportunity to all bidders. The

Supreme Court upheld the challenge, issuing the new state government an injunction to overturn the mandate ("Supreme," 2004).

Brazil's F/OSS stance has drawn similar criticism internationally. In December 2003, the United Nations held the World Summit on the Information Society. Brazil—acting in increasingly common alignment with India, South Africa, and China—pushed participants to endorse F/OSS software as a strategy for mitigating the digital divide. Representatives from the industrialized nations, however, rejected any explicit endorsement, on the grounds that it would signal not an equal playing field but a different kind of monopoly that excluded proprietary software makers (Schenker, 2003).

The company that receives the brunt of the blame for the inequities of the global software market and the coercive global politics that maintain it is Microsoft. In March 2004, Amadeu was quoted in Carta Capital, a Brazilian financial magazine, as comparing Microsoft's business practices to those of a drug dealer (Lessig, 2004). Microsoft filed a suit three months later, demanding an explanation and retraction of the comments (McMillan, 2004). International response to the suit was immediate. Three weeks after the suit, a petition supporting Amadeu had garnered over 10,000 signatures. Amadeu himself wrote:

> In response to national and international inquiries from the press, which have been supportive of the Brazilian government in this unprecedented moment in which the president of an important public institution in this country suffers personally the action of those interested in maintaining an hegemonic model, I come forward, after listening to my lawyers and federal solicitors, to say that the judicial provocation against me is, on its own, so unusual and improper that it deserves no answer.
>
> On the other hand, I would like to note that the purchase of software that

preserves the values of openness and freedom is, for the Brazilian government, a subject unavoidably connected to the democratic principle. And as it has been a long and painful path to reach our current stage of democratic development in this country, we will not walk out on our fight.

> If democracy is a value full of ideology, it will never be an insignificant value. If democracy is a dream, it's the one dream this country will never wake up from. The future is free. (Pinheiro, 2004)

While F/OSS's grassroots nature and positioning in debates about globalization provided a point of ideological entry into the PT, it was broader growth of the software development community in Brazil that made it a feasible large-scale alternative to proprietary software. Unlike many other developing countries, Brazil was able to both sustain a grassroots software movement and produce the technology leaders who could implement shifts in policy. Furthermore, Brazil's past experiences with protectionist technology policy had demonstrated the importance of competing with the international market, rather than hiding from it. F/OSS offered a way to do so on a level playing field. As in other contexts, heavy-handed Microsoft tactics have the potential to create a shift in the form and visibility of these debates. Amadeu's response to Microsoft suggests the ways in which broader values can be attached to relatively technical government policies. Migrating to open source software was not just about saving money. It was about freedom.

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NGOs IN THE DEVELOPING WORLD

Gabriella Coleman

Introduction

NGO and non-profit sector interest in F/OSS began to emerge roughly three years ago, in step with the maturation of a number of prominent F/OSS solutions, the growth of private sector and government-sponsored adoption, and the general—and widely publicized—perception that F/OSS constituted a viable, non-commercial alternative to Microsoft domination of the software market. Online literature, journalistic coverage and (limited) scholarship on the topic reveals palpable excitement about F/OSS's potential—often in ways that express and pull together both pragmatic and political motivations.[60] A number of prominent NGO-based F/OSS success stories (both inside and outside the U.S.) have played a large role in widening F/OSS enthusiasm in the sector.[61]

This enthusiasm belied—and sometimes ran aground against—the considerable difficulties many organizations faced (and continue to face) in transitioning to F/OSS. Greenpeace, one of the largest and most fiscally sound non-profits in America, was unable to meet its posited goal of migrating their desktop machines to F/OSS by the end of 2003. More typical NGOs, with limited budgets and small or non-existent IT personnel, face greater hurdles, particularly with respect to Intranet and desktop software.[62] These challenges are usually magnified in the developing world, where institutional resources and society-wide IT infrastructures are inconsistently available or scarce. Adoption is further are hampered in countries (including nearly all developing countries) where the private sector in open source technologies is underdeveloped. Such a sector is indispensable to providing the local tech support and competition in services that can put F/OSS solutions on level terrain with aggressively expanding commercial players, namely Microsoft.

In the past three years, these barriers have diminished in many countries, and show signs of continuing to do so as the F/OSS developer community expands, and as it becomes more responsive to the needs of non-technical users. This progress has underwritten continued and expanding NGO interest in F/OSS technologies, including in the poorest and most challenging locales. This chapter is an exploration of the unique sectoral conditions underlying F/OSS adoption among NGOs, focusing on an account of emerging intermediaries (often NGOs themselves) who promote F/OSS and facilitate its adoption in the NGO sector.

To date, the developer community has played a limited and mostly ad hoc role in promoting F/OSS in the NGO sector. Although there is a powerful and high-profile form of F/OSS

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[60] For a central repository of such documents, see *Free Software / Open Source Software and Civil Society Organizations - the guide*, http://F/OSSforum.tacticaltech.org/

[61] For example, a good portion of Greenpeace servers worldwide run GNU/Linux; SchoolNet Namibia relies on open source operating systems, email-clients and office applications to provide Internet access and training to the nations' schools. Other examples are in India: Goa Schools Computers Project (GSCP), Sarai Cybermohalla, Gram Chitra, Ganesha Project, Sakura Project. In Africa, Schoolnet Namibia and Shuttleworth Foundation TuxLabs. And in Latin America Nodo Tau in Argentina, the Rigoberta Menchu Tum Foundation in Guatemala.

[62] Most NGO/NPs use only three kinds of software: Internet (servers, mail exchange software), Intranet (local network), and Desktop. TTC experience suggests that the majority of F/OSS software currently deployed in these organizations is server-side, such as the market-dominating Apache web server software. Desktop and Intranet deployment is far less frequent though becoming more common, with applications like Mozilla and OpenOffice leading the way.

promotion associated with a number of F/OSS founding figures (among them, Bruce Perens), there are only a few organized, lower-level, developer-driven organizations, such as GeekCorps and Free Geek, that bridge the gap between F/OSS principles and F/OSS implementation in the non-commercial, non-educational sector, where F/OSS business opportunities are limited. Instead, this advocacy work has been taken up in increasingly organized fashion by a handful of American and European NGOs. Organizations such as Tactical Technologies Collective (TTC), my main example here, have developed a strategy of building and connecting grassroots F/OSS resources and expertise within the NGO sector as a basis for extending F/OSS adoption.

These organizations, networks, and strategies are recent, modest in scale, and still very much in formation. F/OSS advocacy in the NGO sector is still primarily characterized by "evangelism" rather than by active adoption. Much of the activity of TTC and similar NGOs is oriented toward the nuts and bolts issues of explaining the general viability and advantages of F/OSS, especially around issues of security, customization, and localization. Within this context, however, TTC works to place F/OSS within an important and, to date, very resonant conceptual framework, emphasizing the symmetry between the professional ethos of many NGO institutions and the underlying philosophy of openness and collaboration that drives F/OSS development.[63]

Tactical Technologies and the Creation of a Fledging Network

A Poland-based NGO founded in 2001, Tactical Technologies Collective's mission is to improve the IT capabilities of NGOs working in the developing world.[64] Although TTC promotes proprietary technologies when necessary or appropriate, F/OSS is the backbone of their efforts.

TTC focused its initial efforts on building a network through which NGOs could learn about F/OSS—something almost entirely absent from the NGO sector before 2001. This has involved building an infrastructure of people, knowledge, resources, documentation, intermediaries, vocabularies, technology, and institutions through which F/OSS can become a more visible and attractive option for NGOs.

Source Camps: Challenging the "Conventional Wisdom" on F/OSS

Instead of building a "virtual" network of partner institutions, TTC chose to ground its network in a series of "source camps"—week-long venues for intense face-to-face interaction among the relevant stakeholders (NGO professionals, F/OSS developers, technology activists seeking to promote F/OSS, technology consultants, local IT professionals). These actors were selected for their capacity to strengthen what TTC calls F/OSS's "local practical implementation capacity." The first of the camps, "Summer Source," was held the last week of August 2003 on the island of Vis off of Croatia's Adriatic coast. It focused primarily on Eastern European NGOs.

Because most source camp NGO participants have little or no direct experience with F/OSS, the camps are oriented toward baseline education about the differences between F/OSS and proprietary software, including social, legal, and technical differences. Some of the initial work, however, involves addressing widely-circulating nuggets of F/OSS "conventional wisdom," especially those that exaggerate the difficulties or the benefits of F/OSS adoption. The question of ease of installation is a frequent example: some see F/OSS technologies as

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[63] This is not by any means unique to the NGO sector. Elsewhere I have argued that one of the defining political elements of F/OSS is its ability to act as an "iconic tactic" by which different social groups take the underlying philosophy of freedom animating F/OSS and translate it new terms to realize other political or economic goals (Coleman and Hill 2004).

[64] TTC is acutely aware of the monetary and human resources required to adopt F/OSS solutions, and consequently avoids treating F/OSS as a "magic bullet" that can easily satisfy all of the technical requirements of NGOs.

excessively difficult to install; others have misconceptions about its simplicity. In practice, the difficulty of installation depends on a number of factors: the particular software application (some applications, like Mozilla, are far easier to install than others, such as task tracking software); the depth and quality of documentation (F/OSS documentation has improved dramatically in the last few years, although the amount and quality of documentation still varies tremendously from project to project); and various externalities such as the cost and speed of Internet connections and the availability of local tech-support.

A second frequent misconception relates to the total cost of software ownership, or TCO. Because downloading and installation of F/OSS software is often free, many conclude that it has a nominal TCO. While licensing fees are small or non-existent, the total cost of ownership for F/OSS can be higher than for comparable proprietary software. In developed countries, a significant share of the F/OSS/Microsoft debate is devoted to competing TCO studies, especially the long term costs of licensing. In developing countries, TCOs can vary for reasons that have little to do with these monetary costs or with the capabilities of the software itself. The existence of a thriving black market in pirated (proprietary) software, for example, often supports local IT expertise trained in that software—typically in industry standards such as Microsoft software. Some NGOs keep their operating costs down by using pirated software and drawing on these support networks. F/OSS technologies and secondary support networks have generally not overcome this illicit network and its lock-in effects in many countries—in fact some studies have suggested that, in underdeveloped markets, toleration of piracy is a rationale business strategy for major commercial vendors because it favors industry-leader lock-in and undermines F/OSS competition (Osorio, 2002).

Another factor shaping cost is the "Microsoft Effect": a set of Microsoft policies and strategies geared towards preserving and extending their market dominance, especially in the developing world where technology markets are growing rapidly. Microsoft has begun to take measures to adapt both to Linux's inroads and to the disparities in its own pricing relative to local incomes. The systematic underbidding of large institutional, educational, and municipal software contracts is one strategy. The recently unveiled 'Windows XP Starter Edition'—a streamlined, cheaper version of their signature OS—is another, destined for contested developing markets such as Thailand, Malaysia, Indonesia, and Russia.[65] Microsoft educational programs designed to provide Microsoft OS's for donated PCs operate in 67 countries. All are recent responses to the rise of F/OSS activity—and at least officially, high levels of piracy—in developing countries.

Many source camp participants are unaware of these programs, but they make and remake software decisions in contexts shaped by the broader market conditions they affect. In the developing world, the lock-in of proprietary industry standards is no longer just a side-effect of piracy. It is actively promoted by increasingly engaged commercial vendors. Because costs of F/OSS adoption have much to do with the penalty of working outside prevailing network effects—in terms of transition, retraining, and support costs—source camp advocates are careful to convey the complexity of this terrain.[66]

Resituating F/OSS: Ethical Frameworks and Conceptual Maps

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[65]   There is very little serious or systematic analysis of this subject. However, MS policies in the developing world, especially as related to Linux are regularly reported in the media. See, for example Kanellos (2004a, 2004b).

[66]   The question of cost is also region-dependent. A number of empirical studies have been completed or are underway which seek to assess this question with more rigor and detail than currently exists. See for example, *Comparison Study of Open Source and Proprietary Software in an African Context: Implementation and Policy-making to Optimise Community Access to ICT* available at http://www.bridges.org/software_comparison/about.html. Also informative is the *The LINC Project Guide to Choosing an Operating System* available at http://www.lincproject.org/toolkit/cos_guide/.

For source camp facilitators, the most common challenges in presenting F/OSS are not misconceptions on the part of participants, but "no conceptions"—no position on F/OSS or sense of its possible role. Source camps consequently devote time to framing this relationship, including creating new vocabularies and knowledge tied to the issues and concerns that arise in efforts to bring F/OSS and NGO worlds together. Crucial to this process is the effort to align F/OSS's philosophy of transparency and accessibility with the broader goals of many NGO institutions to strengthen civil society through forms of community involvement and collaboration. The explicit structure of the source camps, "participatory, non-hierarchical, collaborative, and hands-on," reflects values that TTC facilitators and participants identified as common to both F/OSS and NGO communities. As NGO participants learn about F/OSS, many begin to understand it in relation to the values that animate their professional work. F/OSS's novel legal arrangements, such as 'copyleft,' also provide an important point of engagement. Because NGOs increasingly perceive global intellectual property regulations as contributing to forms of social and economic inequality, the egalitarian principles of access and dissemination mandated in the copyleft are very attractive.

At source camps, this ethical framing facilitates a number of more practical exercises in knowledge sharing among the participants. Whereas many NGO-sector participants lack adequate understanding of the technical, social, and legal intricacies of F/OSS, those involved with F/OSS development or advocacy often have little experience of the economic and technological challenges facing NGOs in the developing world. The common values of transparency, egalitarianism, local capacity building, and access to knowledge create a space where mutual understanding and knowledge sharing can emerge. Intermediaries such as eRiders—a class of technology consultants specialized in the technological needs of non-profits—also play important roles in this process. eRiders often have a broad perspective on developing-world information needs derived from one-on-one experiences with NGOs. For these reasons, TTC goes to considerable lengths

to invite eRider participation in source camp programs.[67]

Knowledge transfer also involves the creation of "conceptual maps" of the F/OSS landscape in order to better understand the ways in which F/OSS is able or unable to meet NGO needs. These are derived from conversation and formal exercises, and later transformed into needs assessment reports that can be accessed by all parties. Replicated in every source camp, TTC has generated a number of highly detailed maps that speak to region-specific needs, as well as addressing issues, problems, opportunities, and concerns that cut across geographical regions.[68]

In addition to rendering the F/OSS landscape visible to NGOs, these maps help define IT development and advocacy roadmaps for the future. By visually and conceptually rendering the gaps in availability (for example lack of documentation for particular applications, or the need to train local technology consultants), these maps shape the evolution of TTC's activities and help define its narrower interventions. As a consequence of these exercises, TTC has begun to place less emphasis on informational activities and needs assessment and more on hands-on technical training. Other notable outcomes include a more aggressive focus on localization, a Migration guide, the Tajikistan F/OSS initiative for schools, a Content Management System project in South Africa, and a series of F/OSS meetings in Georgia, Central Asia, and Brazil.

Pragmatic Justifications

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[67]   To learn more about this initiative and about eRiding see *About eRiding* available at http://www.tacticaltech.org/eriding.
[68]   Several of these conceptual maps are available in report form. For a polished and in-depth report on the state of F/OSS in Africa and its potential for NGOs see *Straight from the Source: Perspectives for the African Free and Open Source Software Movement* (available at http://www.tacticaltech.org/files/straight_from_the_source_may04.pdf). A less-developed version for Latin America, *Projects Mapping and Needs Assessment,* is available at http://www.tacticaltech.org/node/136).

Despite success stories about NGO migration to F/OSS, the terrain of adoption is still bumpy. The politics of open source adoption in the NGO sector continues to resemble evangelism, rooted in efforts to convince NGO of the benefits of F/OSS beyond the variables of cost and ease of use. Although knowledge transfer, mapping exercises, and the identification of shared values between NGOs and F/OSS inform this process, they are not pragmatic justifications in and of themselves. And although NGOs are often attracted by the potential of F/OSS to shift the broader politics of intellectual property, this is rarely a motive that will weigh heavily against practical needs. TTC generally emphasizes three more pragmatic reasons for adoption: security, customization, and localization.

Security

The security claims for open source code are rooted in the argument that ongoing peer review by a large community produces fewer exploitable flaws than the "security through obscurity" approach of proprietary software. The poor security record of many Microsoft products, especially, has brought this argument to a much wider public than was true even three years ago.

In source camps, TTC facilitators make much of the security advantages of F/OSS. Not everyone finds this compelling, in part because many participants hold a narrow view of software security relating primarily to the privacy of records. As one TTC consultant explained, the security message "resonates with about 15-20%" of the NGO participants—generally those involved in political activism and human rights, for whom the confidentiality of internal documents or data may have life-or-death implications. The majority of NGO participants tend to view their records as insufficiently sensitive to warrant careful attention to 'intangible' differences in security. Often, the vulnerability of systems to attack from viruses and other is perceived as a separate problem.

The availability of tech support makes a difference a big difference in this context, both because system administrators are attuned to questions of system security, and because

updating security patches on Linux still requires a degree of technical skill greater than that associated with updating Windows.

Customization and Localization

Customization is intrinsic to F/OSS software and to the F/OSS developer ethos. The availability of the source code provides complete, if often technically demanding, control over design and features at a much more granular level than the configuration and preference options of most proprietary software. Because of these technical demands, however, low-level customization has usually mattered much more to the developer community than to the end user, and in practice has resulted in a proliferation of versions that can be confusing to those end users. Linux distributions, for example, are so well-stocked with applications (4 chat programs, 3 word processors, 2 accounting programs, etc.) that knowing what to use and trust can become a laborious and frustrating research exercise in navigating help programs and testing software. To minimized this source of confusion, several initiatives are emphasizing streamlined distributions that provide only the "essential" tools to meet the needs of NGOs (Debian Non-Profit and TTC's NGO in a Box are two notable examples).[69]

Customization in the sense of 'localization,' however, is becoming more important to the NGO sector. Localization is the process of adapting software so that it conforms to some locally defined need, commonly language. In this case, localization involves rewriting software so that words in menus, dialogs, and dictionaries appear in the target language, a process that often involves complicated character encoding methods for non-western character sets. Because the legal and technological characteristics of F/OSS allow and even encourage customization, F/OSS is at a marked advantage for meeting the requirements of small language groups.[70] Although F/OSS language

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[69]   http://www.tacticaltech.org/ngoinabox, http://www.debian.org/devel/debian-nonprofit/

[70]   See, e.g., translate.org.za, which is

localization is far from complete, it is in many respects ahead of Microsoft and other industry standards in this area.

TTC has begun to view localization as one of the best opportunities for making F/OSS a leading choice for NGOs. Working in collaboration with Aspiration, another NGO focused on F/OSS advocacy, TTC recently hosted a "Localization Sprint" in Warsaw (November 2004). A more specialized event than the source camps, the Sprint brought together localization experts and project leaders to share experiences and compare projects in the hopes of creating new collaborations and clarifying best practices.[71]

Localization has a number of limitations, however, including its lesser impact in regions dominated by major languages, such as Latin America. The market opportunities provided by major languages are strong enough to ensure that proprietary software will be well represented. Second, the lack of a developed IT sector in many localities undermines the volunteer-based structure of participation in F/OSS projects, accentuating the difficulty of funding and sustaining such projects. As project leaders at the recent Brazilian F/OSS conference made clear, donor and state funding for F/OSS localization is relatively rare.

The Broader Economic Landscape

The precarious financial status of much of the NGO sector and the underdevelopment of the IT sector in many parts of the world shapes F/OSS adoption in ways that go beyond calculations of cost. In an era of government cutbacks in funding, NGOs rely increasingly on corporations for fiscal support, including technology grants and second-hand technology giveaways. Technology company philanthropies, especially, tend to make gifts in kind—either in equipment or in services. These often come with or rely on proprietary software, raising the relative initial cost of F/OSS solutions or

F/OSS migration. A significant number of IT solution providers for NGOs, moreover, effectively operate as Microsoft shops— CompuMentor is a prominent U.S. example. When large contracts are at stake, Microsoft has increasingly offered significant discounts. Microsoft's recent deal with SchoolNet—a large, pan-African NGO that works to improve education through the use of information and communication technologies (ICTs)—is an example.

These philanthropies, recycling networks, and discount programs play an exaggerated role in countries where the private sector in IT services (and consequently in F/OSS services) is underdeveloped. As many TTC facilitators observed, NGOs migration to F/OSS is difficult without support from a local private sector in F/OSS technologies, which can bring paid or volunteer personnel, knowledge, and tech support to bear. Although nearly all of this expertise and documentation is also available on the Internet, and while the developer community is generally comfortable with this medium of support, NGOs generally typically have much more difficulty making effective use of virtual help and documentation, especially when they lack dedicated IT staff. This dynamic is most problematic in the context of migration to F/OSS, when end user familiarity and expertise are likely to be lowest. Inconsistent access to the Internet adds to this burden.

To date, local F/OSS communities and service sectors are almost always offshoots of (and dependent on) larger proprietary IT sectors, which provide most of the employment opportunities for IT specialists. As a consequence, the great majority of F/OSS experts in the developing world make their living off of proprietary software (Microsoft, Oracle, Sun, and other products), not F/OSS software. The precariousness of this labor market in most developing countries has the important effect of diminishing the leisure time available for F/OSS projects or for participation in local "user group associations." The time/employment dilemma is cyclical insofar as these are the venues where many F/OSS developers acquire and expand their skills. Such disparities increase the importance of private-sector F/OSS adopters,

working to adapt some of the most popular F/OSS applications (OpenOffice and Mozilla) to all of South Africa's 11 languages.
[71]   http://localisationdev.org/

including anyone from an ISP that runs on primarily F/OSS technologies to a branch office of Hewlett Packard providing Linux support. These become crucial reservoirs of local F/OSS expertise. State, educational, and municipal adoption, while capable of quickly scaling up the number of F/OSS users, are also very vulnerable to this dynamic.

As the pool of IT workers with F/OSS expertise grows—either through direct employment in F/OSS services or as a side interest—chances increase of building and sustaining the social networks characteristic of strong F/OSS communities. Volunteer associations such as Linux User Groups (LUGs) often play a large role, especially as sources of free or low-cost tech support. These can often be tapped by NGOs.[72] Affordable professional consulting services also tend to grow out of this mix. Although TTC does little to shape these larger sectoral factors, it recognizes that the strongest opportunities exist where the macro-level forces underpinning IT sectoral development (pro-technology public policy, economic growth, high educational capacity) are aligned. These set the stage for lower cost migrations to open source.

The Developer Community

In recent years, F/OSS developers have organized a number of programs to provide support for local F/OSS adoption in the developing world, notably GeekCorps, Free Geek, and the South Africa Localization Project. F/OSS evangelism runs strong in the developer community, and has produced an active fringe of NGOs and other organizations devoted to the egalitarian social dimension of F/OSS. Developer-driven approaches have both strengths and limitations, however. Although F/OSS technologies may be well suited for NGOs in many circumstances, developers themselves may not be the best actors to make the case. As one TTC consultant with years of

experience among hackers and Silicon Valley entrepreneurs explained, developers often operate in "silos," cocooned in self-referential exercises without much awareness of external needs. Because the majority of developers work on free software for personal reasons—including recognition by their technically talented peers—there has been less focus, until recently, on understanding the usability needs of non-technical users. For these reasons, Tactical Technologies has shifted its focus over time from developers to technology consultants and other intermediaries, such as eRiders and NGO technical personnel. These provide a different and often more accessible version of F/OSS evangelism, rooted closer to NGO experience and the challenges of building common ground.

This situation has improved significantly with the entrance of large firms like IBM into the F/OSS market, and with the rise of other intermediaries and service providers who target mainstream computer users. Though many F/OSS tools remain challenging to install or use, there have been steady improvements in usability in many of the major software packages. Programs like GNOME, KDE, OpenOffice, and Mozilla have altered the landscape of F/OSS by providing a high-quality user-friendly experience—equaling and in some instances surpassing the major proprietary systems (the recent success of the Firefox browser is a widely-noted example). Where the installation of GNU/Linux was once a grueling ritual of initiation that tested even experienced users' patience and skills, there are now a number of distributions more accessible to novice users, and a number of professional developer communities committed to standardized updates and service cycles (e.g, Ubuntu Linux, which draws on Debian, one of the most popular distributions in the engineering community). Many F/OSS advocates believe that this hybrid volunteer/business model will open much wider paths to adoption. For TTC and other technology advocates committed to both F/OSS as both a technological and social project, these efforts are positively affecting the cost-benefit analyses made by NGOs as they consider F/OSS solutions. In particular, they are making it easier for NGO's to extend their social values into their technological practices.

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[72]   Although such communities track private and public sector interest, there are few strong national or regional patterns. Some cities, like Buenos Aires, Porto Alegre, and Banglore have large and active large associations while in many other regions they are tiny or non-existent.

TTC and others are working to help this
process.

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LEGAL UNCERTAINTY IN FREE AND OPEN SOURCE SOFTWARE AND THE POLITICAL RESPONSE

Jennifer M. Urban

Introduction

By the mid-1990's, the concept of free and open source software was well-established in the information technology industry. The development of Linux and other major projects was well underway, and the legal struggle over ownership of the UNIX code base and its Berkeley derivatives had drawn to a close. Most software licensing lawyers, however, maintained a professional distance from F/OSS licenses and licensing issues. For the average licensing attorney, the concept of generously granting rights, rather than heavily restricting and controlling them, was simply headache-inducing. F/OSS licenses lacked a number of the basic characteristics of proprietary licenses, such as standard legal drafting style and "privity" (a clear relationships between the contracting parties); they existed alongside a perceived lack of control, within F/OSS projects, over the origins of contributions to the code base; they incorporated dangerous and untested ideas like "copyleft," which placed novel restrictions on subsequent development and commercialization.

Lawyers also had trouble weighing and valuing the role that licenses play within the F/OSS community. F/OSS licenses not only define terms of use, but can structure the projects themselves by defining the roles and responsibilities of the contributors. As a consequence, some in the F/OSS community tend to view these licenses as social compacts in addition to legal documents, directed at project participants as well as commercial adopters or competitors. Some of the important F/OSS licenses—notably the GNU General Public License, which is widely seen to bundle a manifesto with an unorthodox software license—emphasize this constitutional function as much as they define and regulate F/OSS within a complex and litigious software marketplace. Moreover, F/OSS development processes by their very open nature, are seen to incorporate problems that in commercial situations would lead to stricter licensing and contractual definitions. As F/OSS projects began to compete with commercial software, they entered a commercial arena where these legal definitions mattered a great deal.

It is in this context that software attorneys began to be genuinely concerned about the legal issues surrounding F/OSS licenses. At the very least, the informal drafting of the most common licenses made it difficult for lawyers to advise their clients about the legal risks associated with licensing F/OSS software. The traditional (and important) lack of warranties and indemnification under F/OSS licenses made it difficult to assess the extent of those risks. Among software attorneys, especially, the perception of higher risk was—and arguably still is—widely shared. Yet the adoption of F/OSS has increased and is accelerating. By January 2004, 14 per cent of U.S. companies had deployed Linux—a 66 per cent increase from 2002 (Schadler, 2004). By 2008, Linux is projected to represent nearly 38 per cent of the market for server sales (MacKinnon, 2004). Apache web servers, licensed under the open source Apache Software License, represented two-thirds of the web server market as of May, 2004 (Miller, 2004). Mozilla's new open source browser, Firefox, surpassed 16 million downloads within a month and a half of its launch. Google runs on a massive Linux server farm. Licensing lawyers now attend professional education programs to get up to speed on F/OSS advising.

Why this acceptance of risk? While there is clearly professional bias toward traditional licensing arrangements and hypersensitivity toward FUD (fear, uncertainty, and doubt), legal uncertainties about F/OSS are genuine. Recent cases have brought a few important legal issues related to F/OSS before the courts, although very little has been resolved to date. Pushback

against F/OSS by proprietary software providers routinely highlights these risks. It is not clear, however, whether recent attempts to slow F/OSS adoption by highlighting legal risks have had any effect, and there is some reason for thinking they have backfired. A number of organizations beyond the F/OSS community, including traditional businesses, governments, and non-profits, have extensive interests in the viability and widespread adoption of free and open source software, and have entered the debate in consequential ways. The F/OSS community itself—comprising commercial and noncommercial developers, hackers, advocates and others—has countered criticism and legal threats with an increasingly well-coordinated information campaign, publishing a stream of commentary, analysis and legal arguments. It has also undertaken collective efforts to identify and replace vulnerable code in major F/OSS releases.

This chapter sketches the major legal uncertainties surrounding F/OSS, some of the efforts to de-legitimize F/OSS or capture its growing value, and finally the nature of the F/OSS community response, which has coalesced into an effective though still-limited political strategy. The primary case study is *SCO v. IBM*—the high profile infringement case brought against corporate GNU Linux users—and the surrounding public relations campaign aimed at undermining public confidence in the legality of GPL-licensed software.

Sources of Legal Uncertainty for F/OSS Licenses

Legal concerns associated with F/OSS licenses traditionally have fallen into two broad categories:

- code ownership (or intellectual property) issues; and
- license enforcement issues (both copyright license and contract).

These concerns tend to affect both licensees and licensors—in large part because, in the F/OSS model, the former often become the latter. The shape of the concerns varies, however,

according to those differences in position. I will visit these concerns only briefly here, as they have been discussed in a variety sources.[73] As with all intellectual property issues in the global marketplace, the issues are made more complex by the international nature of F/OSS projects. Intellectual property and licensing laws vary widely worldwide; of particular note is the variation in patent protection for computer programs—robust in the U.S. but heatedly debated in Europe. For simplicity's sake, this report mainly concerns itself with United States law, but it is only a piece of the whole.

F/OSS licensing models can seem counterintuitive because they exploit intellectual property laws that were designed to empower IP owners to *exclude* other people from making copies or derivatives of the software. While proprietary licenses control what the licensee can do with the software (especially the draconian EULA's most consumers encounter when they purchase software), F/OSS licenses use the licensor's IP rights to *allow* and encourage copying and modifying by anyone, without licensing fees. This is not to say that F/OSS licenses abandon IP rights—quite the opposite. A license such as the GPL depends upon a very robust interpretation of the scope of copyright. But because business managers and IP lawyers generally think of IP as protecting a 'profit center' product and because legal case law, statutes and "standard" drafting practice have developed around protectionist non-F/OSS licenses, uncertainty exists about the scope and enforceability of F/OSS license provisions. Further, because the F/OSS development model is often highly decentralized, there are uncertainties about the ownership of F/OSS code.[74]

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[73] *See, e.g.* Lawrence Rosen, *Open Source Licensing : Software Freedom and Intellectual Property Law* (2004); Dennis Kennedy 2001, Intellectual Property: Policy Considerations From a Practitioner's Perspecive: A Primer on Open Source Licensing Legal Issues: Copyright, Copyleft and Copyfuture, 20 *St. Louis U. Pub. L. Rev.* 345 (2001); Christian H. Nadan, Open Source Licensing: Virus or Virtue?, *10 Tex. Intell. Prop. L.J.* 349 (2002).

[74] Though the image of individual programmers contributing code to in an ad hoc, unplanned

Code: Ownership and Control

Intellectual property law offers developers a number of ways of establishing exclusive rights or protections for their work. Copyright is a primary mechanism. Writing software code is legally characterized as an "expressive" or "creative" act analogous to other forms of authorship, and thereby benefits from copyright's restrictions on unauthorized copying and derivative use. Patents offer a parallel structure of protection, applicable not to the code itself, but to the underlying ideas and methods. Software patents, valid for 20 years, are recognized in the U.S. but remain controversial elsewhere (e.g., in Europe where a state-harmonizing software patent directive was narrowly defeated in the E.C. in 2004). Although patents provide stronger levels of protection, with fewer limitations on rights, copyrights last a great deal longer: 95 or 120 years for an institutional copyright holder and life plus 70 years for an individual.[75]

Other mechanisms and secondary rights also shape the ownership of software. Trade secret law—a legal structure for protecting and regulating industrial secrets—offers one strategy. Performance and exhibition rights—a subcategory of copyright that governs the right to perform or display works—are another, applicable because of the ways in which computer code mediates users' experience of a creative work. (Video games are a prominent example.)[76] Trademark is still another, relevant not only to branding exercises, but, in the F/OSS context to indicate the source of the code and to ensure the main stakeholders of projects retain some control over the use of key identifying terms.[77]

F/OSS licenses rely on combinations of these rights, as well as on contract law to ensure that licensees can modify and use the code broadly. Given the complexity of these overlapping mechanisms, it is often difficult to tell which protections are being invoked. The GPL drafters argue, for instance, that the GPL constitutes a "bare license" that does not rely on contract law to enforce its provisions. In practice, the alignment of these rights makes it simpler to assert excludability than to define the legal bases of open access.

In the F/OSS context, concerns about IP ownership arise for two related reasons: (1) the large number of contributors who add to the code base; (2) the perceived lack of any practical means of verifying the sources of their work. In theory, each contributor owns the copyright to her contribution and licenses it (via a F/OSS license) back into the project. This means that for large projects, many different contributors hold copyrights to pieces of the code. For IP lawyers and F/OSS advocates, this creates a basic problem: who enforces these copyrights if

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manner is central to the story of F/OSS, some projects (notably, high-profile projects such as Linux and Apache) accept code in a highly hierarchal, controlled manner. Conversely, "proprietary" code is generally assumed to be developed in a highly controlled environment, with all intellectual property clearly owned by the developer or the company that employs her--an assumption that is belied by real world examples. One such example, the SCO litigation (see below), dramatically reveals the complexity involved in tracking ownership of a large, legacy code base. Companies vary greatly in their attention to intellectual property auditing and control. As proprietary software is generally kept secret and released only in binary form, the amount of infringing material that leaks in is unknown.
[75] 17 U.S.C. §302.

[76] The F/OSS model has also been applied directly to digital versions of books, music, etc., for example by the Creative Commons project. *See* http://www.creativecommons.org (last visited Feb. 1, 2004).
[77] For example, Linus Torvalds holds the trademark LINUX. While the underlying code can be modified by any user, Torvalds reserves the right to decide what changes can be called part of Linux. Similarly, the Apache Foundation holds a trademark in APACHE for web servers. The Open Source Initiative actually holds a trademark in the term "Open Source" and "OSI Certified" for software licenses; it uses these marks to designate licenses that meet its Open Source Definition. As such, OSI has some measure of control over the meaning of "open source" in the context of software licenses.

they are infringed (for example, if GPL-licensed code is released under a proprietary license)? Open code and the often-limited financial resources of F/OSS projects create a asymmetry in the effective capacity to defend copyrights. Because proprietary code is, by definition, closed to scrutiny, it is difficult for F/OSS projects to prove infringement of their work. Because F/OSS code is, by definition, open, proprietary vendors can search the code for possible infringement. (That same openness, however, also makes it easier for the F/OSS community to police the code base and excise questionable material, at least in theory.) Moreover, U.S. copyright law requires that copyrights be registered before a party can bring an infringement action. In cases where F/OSS projects do not keep meticulous track of the licensed contributions, it may be impossible to identify the copyright holders. Under these circumstances, it would likely be extremely challenging for F/OSS projects to defend their code. The Free Software Foundation approaches this problem by requiring a copyright assignment from anyone who contributes to the code base for its projects. This provides the FSF more leverage in defending its code, and it has exercised this prerogative on several occasions by threatening lawsuits. [78]

Complications can arise when developers contribute code for which they hold no rights, as is often the case in work-for-hire situations. Not only does the contributed code constitute possible infringement problems, but code derived from such work may also infringe. Because of this lack of control over the origins of individual contributions, F/OSS licenses do not provide warranties[79] or indemnities to licensees. This structural uncertainty has already

been exploited by The SCO Group in its cases against some Linux end-users and in its demands for licenses from 1500 large companies.[80]

Ownership concerns are exacerbated in the context of software patents, as controlling contributions to the code base is not necessarily enough to escape liability. Patents provide very strong rights, and protect entire methods of accomplishing a task. Guarding against patent infringement means not only knowing one's own code base, but also knowing if any applicable patents exist. This is not an easy or inexpensive task,[81] and the F/OSS community rightly considers patents a substantial risk to free and open source software. Patents are a serious issue for all software projects, including proprietary projects, and the resulting uncertainty taints software generally. However, the same dynamics of openness and limited resources put F/OSS at an even greater structural disadvantage with respect to patents. Potential plaintiffs (whether legitimate or 'trolls') can search F/OSS code for infringement. F/OSS projects, on the other hand, have been reluctant to enter the patent game—although some F/OSS advocates have explored defensive uses of patents. [82]

License Enforcement and Interpretation Issues

To date, F/OSS licenses have not been widely tested in the courts. The recent Sitecom case, in which a German court upheld the GPL, is the first significant example. Here, the lack of

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[78] *See* Eben Moglen, "Why the FSF Gets Copyright Assignments from Contributors," Free Software Foundation, *at* http://www.fsf.org/licenses/why-assign.html (last visited Dec. 6, 2004). For many projects, however, the copyright remains with the contributors.

[79] This brings up a possible drafting concern as well: a disclaimer of warranties for noninfringement often has to be explicitly stated in order to be enforceable. Many F/OSS licenses do not specifically disclaim noninfringement.

[80] See Section III, *infra*.

[81] Patent's willful infringement doctrine makes policing patents even more challenging: because patent law allows for treble damages if the infringer knew of the patent he is infringing, there is an enormous incentive not to look at relevant patents, at all. The resulting uncertainty can only increase concerns that problematic patents may exist, likely at any moment to appear in the hands of a litigant and sink a project.

[82] Patent litigation is famously complex and expensive, and many companies cannot afford to expend the resources required to defend against a well-funded and determined adversary. Uncertain liability for infringing code within group projects complicates matters further.

precise legal language in many of the common licenses (for example, the GPL and the BSD variants) and questions regarding enforceability of their provisions, create uncertainty about their enforceability and how they should be interpreted. The lack of clear assent to the license terms by the licensee is one such challenge. The GPL and BSD family of licenses are simply "included" with the software, sometimes in the notes to the code, sometimes separately. The Free Software Foundation, especially, has been creative in its arguments on this point, but it is unclear whether a court would review the GPL under contract law, which has strict requirements of notice and evidence of agreement by both parties. [83] The wording of F/OSS license provisions can also cause confusion; for example F/OSS licenses often grant a right to "modify" the code. Most F/OSS developers and advocates understand this to include the right to create derivative works, but not all modifications rise to the level of a derivative work under copyright law— traditional license provisions track words directly from the IP statutes, avoiding this uncertainty. There is further uncertainty about the overall status of the licenses: are they copyright licenses, patent licenses, or both? As the definitions and

commercial functions of F/OSS concerns are explored by courts, these distinctions become increasingly important. A growing number of F/OSS licenses do reflect closer attention to legal conventions. For example, the widely-used Mozilla Public License is very tightly drafted, making challenges to the enforceability of its language and interpretation issues less likely. As such, the MPL has influenced a number of corporate-sponsored F/OSS licenses. The forthcoming GPL 3—a revision of the GPL—is also likely to address some of these issues, especially regarding patents. Finally, the constant proliferation of license types exacerbates these interpretation challenges. Despite F/OSS community efforts to reign in this tendency, OSI has approved over 50 licenses as of this writing. [84]

Yet plain language *is* important, particularly for F/OSS licenses which also play the role of social contracts among contributors. Traditionally-drafted licenses, such as Microsoft's EULA, are generally daunting for the non-lawyer; this is also true of some professionally-drafted corporate F/OSS licenses. In the bottom-up F/OSS development system, this can *create* uncertainty for contributors and adopters rather than reduce it, especially when the goal is to expand F/OSS communities. The Creative Commons licenses provide one method of addressing this conundrum by combining professionally drafted licenses with a plain language file that lets non-

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[83] In order for an enforceable contract to exist, the parties must agree to the terms. (Thus we have clickwrap licenses that insist the user clicks on "I Agree" to the EULA before the software will install.) F/OSS projects generally have as many licensors and licensees as they have contributors, making the relationships that result in enforceable obligations (known as "privity") difficult to ascertain. The drafters of the GPL attempt to avoid this issue by stating that it is a "bare license"—that is, every requirement is simply a condition of the license grant, which can be revoked at any time. Assent is assumed, because the licensee's right to use the software would, without the license, not exist at all. GNU General Public License, *Terms and Conditions for Copying, Distribution, and Modification*, Free Software Foundation, *at* http://www.fsf.org/licenses/gpl.html#SEC3 (last visited Feb. 1, 2005). In theory, no agreement between the parties is needed. While it is well-settled law that a licensor may generally impose restrictions and revoke a license at any time, the GPL relies on an especially expansive interpreation of this doctrine.

[84] OSI approves any license that follows the Open Source Definition, although it encourages licensors to use existing licenses, if possible. For a clear example of how a large number of licensing schemes can be issue, see the Free Software Foundation's discussion of licenses that are "compatible" and "incompatible" with the GPL: Various Licenses and Comments about Them, Free Software Foundation, *at* http://www.fsf.org/licenses/license-list.html (last visited Feb. 1, 2005).. The vast majority of F/OSS projects use one of a few licenses, most commonly the GNU GPL, or the less demanding BSD-type licenses. The Mozilla Public License is also growing in popularity. *See, e.g.*, Statistics on project licenses, Sourceforge.net, *at* http://sourceforge.net/softwaremap/trove_list.php?form_cat=14 (last visited Feb. 1, 2005).

lawyers know at a glance what the license means.[85] Similarly, the Free Software Foundation's website provides a great deal of information intended to help GPL users understand what is intended by its terms.[86] In the end, however, enforcing a license might require going to a court, which will make decisions based on standard conventions and previous caselaw rather than what the license drafter says she intended. In addition, while the FSF is likely to enforce the GPL according to its interpretation, other licensors who have used the GPL might take a different tack. Legal uncertainty, then, remains.

The Effect of Political and Economic Interests in F/OSS

Although courts have yet to weigh in, a number of organizations have extensive interests in the viability and widespread adoption of free and open source software. Among these are large IT businesses that contribute to the code base and use the licenses for their own releases, such as IBM and Sun Microsystems; other large businesses, such as Merrill Lynch, that in-license F/OSS; and a wide variety of states, public agencies, and non-profits.[87] Legal uncertainty is a definite concern for these actors, as the city of Munich demonstrated by (temporarily) halting its city-wide F/OSS migration because of concerns about emerging EU software patent law.[88] Other organizations, most notably Microsoft, have taken active steps to highlight the liability risks of F/OSS. Absent relevant court verdicts, this is mostly a campaign of vague threats, with dubious results.[89] In

November, 2004, for example, Microsoft's CEO stated publicly that organizations using Linux might be at risk of intellectual property suits.[90] Yet in a 2001 internal study, Microsoft found that messaging campaigns against F/OSS that focused on legal issues were not effective tools for slowing Linux adoption.[91] Overall, the progress of F/OSS adoption indicates that legal uncertainty is not outweighing the perceived advantages of price and customizability.

Members of the F/OSS community have obvious (though often individually economically small) stakes in the debate. From Richard Stallman to Eric Raymond to Bruce Perens to the less-well-known hundreds-of-thousands of individual F/OSS enthusiasts, the F/OSS community has effectively leveraged the platform of the Internet to test criticism of F/OSS and to define the debate. While these actors are (for the most part) not lawyers, they have become well-versed in the legal issues, and exhaustively and eloquently dissected threats to the F/OSS model. While the effects of their work cannot be quantitatively measured, and while their opinions may or may not hold sway with courts, their influence on the perception of legal uncertainty in and around the F/OSS community and on the capacity of diverse F/OSS actors to defend those arguments has been substantial. Certainly, members of the community feel that their efforts have paid off with regard to Microsoft's anti-F/OSS rhetoric. [92]

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[85] The Creative Commons website includes a cartoon that explains the system here: Neeru Paharia et al., *How It Works*, Creative Commons, *at* http://creativecommons.org/about/licenses/how2 (last visited Feb. 1, 2005) (displaying a cartoon that explains the system).

[86] *See, e.g.*, Free Software Foundations, "Frequently Asked Questions about the GNU GPL," *at* http://www.fsf.org/licenses/gpl-faq.html#GPLRequireSourcePostedPublic .

[87] *See, e.g.*, K.N. Cukier, Chapter 3; Volker Grassmuck, Chapter 2

[88] *See* Volker Grassmuck , Chapter 2.

[89] *See* Grassmuck, *id*.

[90] *See See* Ina Fried, *Ballmer Attacks Linux on Patent Front*, CNET News.com, (Nov. 18, 2004) *at* http://news.com.com/Ballmer+attacks+Linux+on+patent+front/2100-7344_3-5457879.html?tag=nl.

[91] *See* Microsoft, "Research E-Bulletin: Attitudes Towards Shared Source and Open Source Research Study" *available at* http://www.opensource.org/halloween/halloween7.php (last visited Feb. 1, 2005). While some corporate sponsors of F/OSS have become evangelists, by far the most enduring, vocal advocates for F/OSS are those from the F/OSS developer community.

[92] See *supra* note 91; the annotated version of the Microsoft memo available on the OSI website includes commentary by Eric Raymond analyzing Microsoft's concerns and the F/OSS community's efforts at messaging.

The F/OSS community provides extensive commentary on each of the issues described above. The Free Software Foundation's website provides not only detailed information about the intended meaning of the GNU GPL, but also interpretation of the larger political and social dynamics affecting F/OSS adoption, such as the observation that licensees rarely have an incentive to claim to a court that the GPL is unenforceable because it would deprive them of their right to use the software. The FSF also documents different licenses' compatibility with the GPL. Because both licensees and potential licensors often look to Richard Stallman, Eben Moglen and the FSF to explain the GNU GPL and criticisms of it, this may be a more effective method of reducing uncertainty than it seems at first glance. Licenses, after all, attempt to regulate behavior. If everyone involved follows an interpretation understood by all to be the proper one, courts will enter the picture only rarely.

OSI also provides detailed online information about open source licenses and the risks of open source adoption. More assertively, OSI uses its trademark on the term "open source" to police what can and cannot be called an "open source license." This control over semantic borders provides considerable leverage in maintaining the coherence and—to some extent—the legal integrity of a wide range of open source projects.

Increasingly, governments (particularly municipal governments and governments of developing countries) have weighed in in favor of F/OSS adoption. Famously, a Peruvian congressman named Edgar Villanueva Nuñez wrote an eloquent letter in favor of a 2002 Peruvian bill to require the state to use F/OSS. Nuñez was responding to a Microsoft executive's criticisms of the bill, and argued in part that F/OSS was the only way to ensure responsible use of public funds, permanence of public data, citizen access to public data, and security.[93] Since Nuñez's letter, government

adoption has only increased. Brazil's President Luiz Inacio Lula da Silva has touted F/OSS as a way to train Brazilians to be technically proficient while avoiding "economically unsustainable" Microsoft licensing fees.[94] Numerous developing countries around the world have embraced or are exploring F/OSS to solve language localization problems and to create robust, economically sustainable platforms for their governments and citizens.[95] The wealthy European countries of France and Germany are also attracted to F/OSS, despite the challenges noted above (Hatlestad, 2004). The Los Angeles City Council, as of this writing, is discussing switching government systems to F/OSS to save money for hiring more police officers (Jardin, 2005).

The economic interests in sustaining the F/OSS development and licensing models, then, are substantial. Against this backdrop, a handful of recent legal disputes confront some of the uncertainty surrounding F/OSS licensing.

Current Cases

Several current disputes, most importantly the SCO Group cases, illustrate the dynamic between the legal uncertainties around F/OSS and the larger political struggles over F/OSS adoption.

Sitecom/Netfilter Case

The GPL received a boost in April, 2004 when a German court stopped Sitecom, a Dutch company, from distributing the code for netfilter/iptables, which is licensed under the GPL, without attaching the GPL license text or

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[93] For links to translations of the letters, and OSI's discussion, see OSI, "Peruvian Congressman refutes Microsoft's "Fear, Uncertainty and Doubt" (F.U.D.) concerning free and open source software"

at http://www.opensource.org/docs/peru_and_ms.php.
[94] AP, "Brazil Gives Nod to Open Source," *Wired News* (Nov. 16, 2003) (quoting da Silva's National Information Technology Institute head, Sergio Amadeau) *at* http://www.wired.com/news/infostructure/0,1377,61257,00.html.
[95] *See. e.g.,* David Becker, "Se Habla Open Source?" *CNet News.com*, (Feb. 16, 2004) *at* http://news.com.com/Se+habla+open+source/2100-7344_3-5159179.html?tag=nl (discussing initiatives in Rwanda, Slovenia and India, among others).

including the source code (Shankland, 2004). By enforcing the GPL against Sitecom, the German court became the first court to issue a published decision enforcing the GPL.

German courts have no precedential weight in the U.S., and little if any persuasive weight.[96] Moreover, the differences between U.S. common law and German civil law systems suggest caution in generalizing about the logic and impact of the case.. Nonetheless, the Sitecom decision is a positive development for at least two reasons beyond its German context:

- Because F/OSS is a truly international undertaking, the harmonization of legal interpretations of F/OSS is becoming increasingly important. Positive early precedents can have a disproportionate impact on the direction of this harmonization, and European precedents carry considerable weight in other national and international IP law.

- U.S. courts notwithstanding, support for the GPL and other F/OSS licenses in the international community will help build F/OSS market share worldwide. Because F/OSS is a network good that grows in value with the number of users, U.S. courts may eventually be faced with a social and technological fait accompli, in which undermining F/OSS licenses would have unacceptable costs for the U.S. business community.

Mambo/Furthermore Dispute

Issues of code ownership have been at the center of the Mambo/Furthermore dispute. The president of Furthermore, Brian Connelly, claims that developers he hired to create code for his company illegally released it into the GPL-licensed Mambo code base. Some of this dispute has taken place in public on the

respective company and project websites, including Furthermore's initial cease-and-desist notice to Mambo and Mambo's reply[97] Negotiations recently broke down, and Connelly has threatened to sue Mambo end-users (McKenzie, 2004). While this dispute may never advance beyond threats, the copyright ownership issues (particularly the work-made-for-hire issues stemming from the independent developers' release of code into the Mambo code base) exemplify some of the larger F/OSS concerns with unattributable code. Further, the public nature of the dispute raises questions about political limitations of F/OSS preferred model of open discussion and resolution of issues.

The SCO Cases

In March of 2003, The SCO Group of Utah sued IBM for $1 billion (this grew to $5 billion[98]), claiming that IBM had included SCO's proprietary code in a Linux distribution.[99] Originally, SCO explicitly noted in its complaint that the suit was not about the relative merits of open source versus proprietary software.[100] In its press strategy, however, SCO clearly exploited uncertainty about the GPL and the Linux code base. By the time it filed its answer to IBM's counterclaims, SCO was casting the GPL in an extremely dubious light, stating that it

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[96] A "precedential" decision must be followed by a court; for example, a Supreme Court decision must be followed by any United States federal court. A persuasive decision provides reasoning that might be useful and persuasive to a court that is not bound to follow it.

[97] Official Statements and Responses, Furthermore, *at* http://www.literatigroup.com/versusmambo/content/view/54/ (last visited Feb. 1, 2005); Mambo, *at* http://mamboserver.com/The_News/News/Statement_regarding_Furthermore.com/ (last visited Feb. 1, 2005).

[98] See Second Amended Complaint, Paragraphs 1-4, 6 of the prayer for relief.

[99] Complaint, Para. XX

[100] Complaint para 3 "This case is not about the debate about the relative merits of proprietary versus open source software. Nor is this case about IBM's right to develop and promote open source software if it decides to do so in furtherance of its independent business objectives, so long as it does so without SCO's proprietary information. This case is, and is only, about the right of SCO not to have its proprietary software misappropriated and misused in violation of its written agreements and well-settled law."

"violates the U.S. Constitution."[101] One month later (March, 2004), SCO sued two Linux end-users, AutoZone and DaimlerChrysler, claiming that their distributions of Linux infringed SCO copyrights. Because the GPL provides no warranties or indemnities for intellectual property infringement to licensees, SCO argued that Linux end users were the liable parties. Its press strategy was clearly intended to cast suspicion not only on IBM's strategy for releasing code into the Linux project, but also to create concerns about liability among all Linux licensees (Shankland, 2003). SCO's CEO compared the suits to the Recording Industry Association of America's lawsuits against peer-to-peer users, stating, "It wasn't until the RIAA launched a series of lawsuits against end users that the end users became fully educated."[102] SCO's Chris Sontag stated that it is "appropriate that we warn commercial companies that there are intellectual property issues with Linux." (Shankland, May 14, 2004).
SCO clearly views the lawsuit as a revenue source; it has sent demand letters to 1500 corporations, and offered licenses to Linux users for $1399 per single-processor server (Becker, Aug. 5 2003). Perceptions about its motives were not helped when it enlisted the financial help of Microsoft in pursuing the case (Shankland, Nov. 15, 2004).

Competitor Reactions

Because the SCO cases involve the legality of a widely-deployed enterprise system, large companies have a stake in the outcome. IBM has chosen to defend against the multi-billion dollar suit, despite the mounting legal costs of discovery fights and preparation for trial. Explicitly charging that SCO was mounting a campaign of "innuendo and rumor" that threatened "the whole open-source community,"

Red Hat (a Linux distributor) sued SCO for unfair competition and for a declaratory judgment that it was not infringing SCO's copyrights or misappropriating SCO's trade secrets (Shankland, Aug. 4, 2003). Red Hat has also established a fund, seeded with $1 million, to defend individual developers and non-profits against SCO.[103] Another fund, run by the Open Source Development Labs (a consortium which sponsors two Linux projects), has attracted funding from Intel, IBM, MontaVista Software Inc. and others, and has a goal of $10 million (Weiss, Jan. 12, 2004).

Some companies, including Hewlett-Packard (Fried, Sept. 24, 2004), Novell (Shankland, Jan. 13, 2004), and Red Hat (Shankland, Jan. 19, 2004) have begun offering legal protections to Linux licensees. HP offers a limited indemnity—good only against threats from SCO--to Linux licensees, provide they do not modify the code received from HP. Red Hat offers a warranty stating that it will replace any infringing code. Novell's indemnity is limited to $1.5 million or 1.25 times the software support price. Although these legal protections are limited, they represent a real decrease in uncertainty for smaller companies that license Linux from these distributors. (IBM has not offered an indemnity, claiming that SCO's claims are without merit.)(Lyons, Aug. 5, 2003).

Publicity and Response

Competitors of SCO are not the only players to see the benefits of reducing legal uncertainty around Linux. Open Source Risk Management opened its doors in 2003, as the SCO cases dominated discourse about F/OSS. OSRM offers risk assessment to both companies and individual developers (Linux developers can buy a membership for $250 a year), and provides indemnification for copyright risk for Linux users. Some saw OSRM as a political misstep on the part of some in the F/OSS community. Pamela Jones of Groklaw (see below) was originally prominently involved in its inception. While the organization hoped to be seen as a demonstration that supporters of F/OSS were willing to stand behind it financially, critics saw

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[101] SCO's Amended Answer to IBM's Amended Counterclaims, Groklaw, *available at* http://www.groklaw.net/article.php?story=2004020 7012652733 (Feb. 4, 2004).("EIGHTH AFFIRMATIVE DEFENSE. The GPL violates the U.S. Constitution, together with copyright, antitrust and export control laws, and IBM claims based thereon, or related thereto, are barred.")
[102] *Id*.

[103] *See id.*

Jones's involvement as an indication that she thought F/OSS has serious IP problems; in the end, she resigned from the organization, stating that "money is nice, but integrity is everything" (i-Technology News Desk, Nov. 21, 2004).

Initially, some in the business press were dubious about IBM's chances. Daniel Lyons, writing for the online version of *Forbes*, went so far as call IBM's defenders in the F/OSS community "religious folk" who needed to "wake up." (Lyons, June 18, 2003). Lyons based his argument not on the strength of SCO's legal claims, but on its business interest. IT-centric publications also expressed concern, with Jon Dvorak of *PC Magazine* criticizing the F/OSS community for not "realiz[ing] that Linux and the entire open-source movement are at grave risk," (Dvorak, June 2, 2004; Cooper, July 18, 2003). and Charles Cooper of *CNET News.com* arguing that F/OSS's lack of indemnification posed clear risks for adopters. Yet the press was not entirely cohesive on this topic, and some reports sought viewpoints that examined the legal challenges for SCO (Gaither, Aug. 6, 2003; Galli, Aug. 25, 2003). Reporters have followed, and reported on, recent legal developments indicating weaknesses in SCO's case (Shankland, Feb. 9, 2005). Further, the F/OSS community itself has been well-represented in press reports around the SCO case (see below).

Legal uncertainty, in the end, is business risk, so analysts' recommendations can help indicate the effect of uncertainty on the market. Analysts initially split their assessment of *SCO v. IBM*, with Forrester arguing that IBM would simply buy SCO and Gartner urging companies to "minimize Linux in mission-critical systems (Gilbert, May 27, 2003). According to CNET's *News.com,* however, anecdotally, IT managers were not reconsidering deployments of Linux in the face of what they clearly saw as an uncertain situation.[104] By November of 2003, Gartner had seemingly revised its analysis, voiced concerns about SCO's legal expenses, and began advising companies not to pay SCO license fees unless unequivocally required by a court (Weiss, Nov. 19, 2003). In March 2004, Forrester released a survey of 140 "large American companies," in

which it found that 60 percent of the companies were adopting open source, and only 39 percent planned to "avoid [it] for now." Ted Schadler, writing for Forrester, trumpeted the benefits of open source and took issue with perceived risks:

The Linux community will rip and replace any contested code, thus giving you a royalty-free product to use. The real risks are more mundane: Who will support the component? Will your commercial application provider support the upgraded open-source component? Did you inadvertently use a General Public License component in a product that you shipped to a customer? (Schadler, Mar. 18. 2004).

While 39 percent is not an insignificant number, the adoption rates overall show that F/OSS is in no danger of being snubbed generally due to SCO's claims.

The F/OSS Community Response to SCO

Any lawsuit that has the potential to shake up an industry will result in defensive action by competitors, commentary by industry analysts and a reaction by the stock market. What makes the F/OSS market unique is its knowledgeable and dedicated community of F/OSS developers and supporters, who see no reason to stop at developing the code in F/OSS projects when they can actively support the model politically. The F/OSS community's response to the SCO case provides an example of how its culture of constant public commentary on projects can adapt to new discursive terrain, in the process leveraging some of the same effects of numbers and forms of personal authority that organize F/OSS development work. Self-publishing via the Internet plays a large role in this effort, as does the aura of economic disinterest (whether or not accurate) that frames most of the F/OSS arguments about open code. Technology and business journalists have been increasingly responsive to this strategy, with the effect of forcing SCO to speak directly to the F/OSS community. SCO CEO Darl McBride's "Open

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[104] *See id.*

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Letter to the Open Source Community," was the most striking of these efforts, and somewhat notorious for claiming that statements by Bruce Perens constituted proof that Linux infringes Unix (McBride, Sept. 9, 2003).

There has also been substantial grassroots participation in the legal discussions surrounding F/OSS, notably through the Groklaw project [http://groklaw.net/]. Groklaw is a website (originally a weblog) founded by a paralegal, Pamela Jones, to provide information on the SCO lawsuits. By her own account, Jones began publishing information about the SCO case as she grew angry at SCO's legal tactics. Her reasons for becoming involved are illustrative of the ways that the pragmatic commitments of the F/OSS development community translate into political advocacy. In an interview, she stated:

I reasoned like this originally: I am not a lawyer. I am not a programmer. I have no influence. I have few friends in high places. I am not a political person. I belong to no organizations. What can * I* do? … I wanted to do something. I love GNU/Linux software. It taught me how much fun computers can be. I love seeing into the process. I love the ideals behind free software, specifically, caring about other people and not just yourself, and cooperation, and being able to look at the code and even change it and share it freely… All right, I said to myself, what can I do well? The answer was, I can research and I can write (Jordan, July 31, 2003).

Groklaw has grown to include every significant filing in all of the SCO cases—hundreds of documents—most with detailed commentary by Jones or other contributors to the site. Groklaw went beyond this role when, speaking for the "open source community," contributors posted a very sophisticated response to McBride's Letter (Orion, Sept. 20. 2004). Groklaw has also

remained a key site for collaborative research on important historical aspects of the case. Recently, a contributor posted the original Unix settlement agreement between Unix Systems Laboratories and the University of California, a document which provides important details about the chain of ownership of Unix. The settlement was confidential and has long inspired speculation, yet it was a tenacious independent Groklaw supporter who thought to use California's version of a FOIA request to obtain the content. The agreement grants the public rights to redistribute much of the Unix source code, and could be a significant development in favor of IBM (Jones, Nov. 28, 2004; McMillan, Dec. 2, 2004). In effect, Groklaw has become an informal research center for the F/OSS community's efforts to dispel legal uncertainty surrounding Linux, the GPL, and to a lesser extent, F/OSS in general. Such a public resource, explaining litigation in real time to all interested or affected parties, is unusual if not unprecedented.

Groklaw operates on the same volunteer basis as F/OSS development, and with the same informal authority structure built on the credibility and effort of the founder. Like other F/OSS projects, it maintains its centrality in the face of possible 'forks' in the epistemic community. Groklaw is not the only F/OSS community discussion of the SCO case, though it is by far the most extensive. LWN.net, a Linux new site, began to track the SCO case and offer documentation, but it eventually deferred to Groklaw ("A Look at," Feb. 1, 2005). Rob Landley, Eric Raymond, and others published an exhaustive critique of SCO's Second Amended Complaint on the OSI website (Landley, Feb. 1, 2005). Bruce Perens, Eric Raymond and Greg Leahy have all analyzed SCO's public presentation of some of the code implicated in its suit, and have published their analyses online.[105]

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[105] *See e.g.*, Bruce Perens, *Analysis of SCO's Las Vegas Slide Show*, *at* http://www.perens.com/SCO/SCOSlideShow.html (last visited Feb. 1, 2005); Greg Lehey, *SCO's Evidence of Copying Between Linux and UnixWare*, *at* http://www.lemis.com/grog/SCO/code-comparison.html (Jan. 2, 2004).

Grassroots engagement has also coalesced around the technical defense of the Linux and other F/OSS projects from SCO-like claims. Developers have mobilized extensively around the search for (and elimination of) potentially infringing code. In the SCO case, this effort has been hampered by the fact that not all of the code at issue has been publicly identified. Nonetheless, the process itself represents a great asset for F/OSS projects—although the openness of the code encourages infringement claims, it also means that they can be addressed in an efficient and timely manner.

Whither SCO?

For purposes of this chapter, the SCO cases are important because they highlight both the legal threats to F/OSS and F/OSS community strategies for managing them.[106] The perceived high stakes for Linux means that a wide range of constituencies have weighed in. It is not entirely clear how meritorious SCO's claims are, but they have at least had the effect of generating a great deal of press. EV1Servers.net was the first company to sign a SCO license, citing the need for "certainty," but it is unclear how many companies have followed suit (Shankland, Mar. 1, 2004). The case has become exceedingly complex, with counterclaims by IBM and the

several other lawsuits noted above, making the end result even harder to predict.

The outcome of SCO's suits will not be known for some time—presently, the IBM case is set for trial in April, 2005, though the parties' motions for summary judgment may be decided before that.[107] Additionally, the cases may settle, resulting in no guiding case law. (It has been speculated that SCO is actually looking for a settlement or for acquisition by IBM or another interested party, but as of this writing the case has moved forward.) Because of the stakes, F/OSS constituencies have reacted in ways that seek to reduce the perception of Linux-related risk. There is some reason to think that that the publicity surrounding the case has lowered this perception of risk over time. As noted, business analysts have become increasingly dubious about SCO's claims, and its stock price has plummeted from over $11.00 a share in June 2003[108] to under $3.00 in the latter half of 2004.[109] In January 2004, SCO revised its November 2003 S3 to note various weaknesses in its case, including statements by Novell that SCO does not own the rights to the disputed code. Red Hat, on the other hand, has seen its stock price grow from around $6,00 a share when it filed suit against SCO[110] to nearly $12.00,[111] indicating

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[106] On the other hand, the SCO cases also clearly demonstrate that code ownership and licensing issues are *not* limited to F/OSS licenses. The Unix code at issue has passed through several sets of hands via a bewildering array of transfer agreements and licenses. Novell, which took ownership of the code from AT&T, expressed doubt that SCO actually had the rights it was suing IBM over. The asset purchase agreement at issue has been described as "murky" and unclear, a reminder that F/OSS licenses are not the only legal documents with interpretation issues. *See* Stephen Shankland, "Contract Illuminates Novell-SCO Spat," *CNET News.com,at* http://news.com.com/2100-1016_3-1013229.html (June 4, 2003). SCO's predictable response: a lawsuit against Novell, claiming slander of title. *See* Complaint, *The SCO Group, Inc. v Novell*, filed Jan. 4, 2004, *available at* http://www.groklaw.net/article.php?story=2004012 6073510407.

[107] SCO is also seeking to postpone the trial. As amply demonstrated by the document timeline maintained by Groklaw, SCO has repeatedly delayed the case through discovery tactics and requests for more time to comply with court orders.
[108] Quotes & Info, SCO GRP INC (THE) (SCOX), Yahoo! Finance, *at* http://finance.yahoo.com/q/hp?s=SCOX&a=05&b= 1&c=2003&d=05&e=30&f=2003&g=d (last visited Feb. 2, 2005) (reporting for June 2003).
[109] Quotes & Info, SCO GRP INC (THE) (SCOX), Yahoo! Finance, *at* http://finance.yahoo.com/q/hp?s=SCOX&a=06&b= 1&c=2004&d=11&e=30&f=2004&g=d (last visited Feb. 2, 2005) (reporting for July 2004 through December 2004).
[110] Quotes & Info, SCO GRP INC (THE) (SCOX), Yahoo! Finance, *at* http://finance.yahoo.com/q/hp?s=RHAT&a=06&b= 15&c=2003&d=07&e=15&f=2003&g=d (last visited Feb. 2, 2005) (reporting for August 2003).
[111] Quotes & Info, SCO GRP INC (THE) (SCOX), Yahoo! Finance, *at*

that the business of F/OSS distribution is still seen as very much a going concern by investors.

Conclusion

Legal uncertainty is a genuine issue for F/OSS. Yet the fiercely rhetorical political and economic debate about F/OSS as both a production model and a legal concept has taken precedence, perhaps obscuring, perhaps actually altering, the true extent of the challenge. While difficulty in managing IP rights, non-traditional license drafting, and a lack of published caselaw reduces adopter confidence in F/OSS solutions, at present the economic and political incentives for F/OSS adoption appear to outweigh concerns about its legal status. The licenses' ability to serve as a kind of social code among developers has served the F/OSS community well—even without court decisions, and even with the constant debate that characterizes F/OSS development, accepted interpretations of thorny provisions promulgate through the F/OSS community. Simultaneously, the F/OSS system is maturing with its growth: F/OSS licensees and developers are acting to reduce risk in a variety of ways, and F/OSS is also beginning to adopt some traditional safeguards, such as intellectual property indemnities. The ability of the F/OSS community to mobilize around threats to the model has been crucial to this (tentative) success. F/OSS communities have proven adept at undertaking the technical fixes that would guarantee unencumbered code, and, significantly, at conducting the commentary and education campaign—in and outside core F/OSS constituencies—that begin to shift perceptions about F/OSS.

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http://news.com.com/Red+Hat+files+suit+against+ SCO/2100-7252_3-5059547.html?tag=nl (last visited Feb. 2, 2005) (reporting for February 2005).

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F/OSS OPPORTUNITIES IN THE HEALTH CARE SECTOR

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Health care, taken broadly, is one of the largest sectors of the world economy (in the U.S., it is the largest, comprising over 14% of GDP) (OECD Health Data, 2004). Predictably, the provision of information technology designed to support health care services has also become an enormous and growing market. The health care information technology (HCIT) sector is distinguished by several factors:

- The fragmentation of the market among many thousands of commercial providers. To date, HCIT has no Microsoft, or even a small group of dominant corporate players;

- The high degree of involvement by public and government agencies, reflecting the critical role of the government as both a steward and a provider of health services. This role includes direct funding of HCIT, regulation, and support for standardization;

- An acute, across-the-board need for accountability and transparency while maintaining patient privacy;

- Cost pressures across the sector, from the spiraling costs of developed-country health care systems to the inability of developing countries to afford IT systems at Western market prices;

- Disproportionate cost pressures on small health care providers, who require the same level of automation as large providers but who cannot afford the fully-featured software packages offered by the larger vendors;

- A socio-economic environment in which patients are accustomed to paying for services rather than for goods;

- Growing public access to medical information (e.g., on the Internet), with new forms and expectations of professional accountability for health outcomes.

Together, these factors structure a set of interesting conditions, risks, and especially opportunities for F/OSS adoption, potentially greater than in any other field. Yet there are significant barriers to F/OSS adoption, foremost of which are the lack of coherent government policy on F/OSS, concerns about liability issues in case of system malfunctions (especially in the context of the General Public License (GPL), which offers software without warranty), and questions about the viability and applicability of F/OSS business models in the field.

F/OSS activity in the health field is in its infancy. This contribution focuses on one of the major HCIT sub-fields—software for Electronic Medical Records (EMR)—and investigates (1) emerging open source projects in this unique health care environment; and (2) the conditions for wider adoption. Although F/OSS does not yet have significant presence in the health field, conditions in the sector suggest that health care could soon become a key site not only for 'horizontal' infrastructures like operating systems and databases, but also for 'vertical' F/OSS adoption encompassing the full stream of health services from providers to end-users.

Challenges in the Health Care Sector

The global health care sector in general and the U.S. health care system in particular are outstandingly inefficient. While increased levels of automation and advances in medical technology facilitate better treatment for disease and injury, the same cannot be said for management and clinical processes within and among health care delivery organizations,

notably hospitals.[112] The clinical workflow at most provider organizations still depends on manual, paper-based systems augmented by partial automation. These lag behind the systems used by industries like banking and insurance by at least a generation. The resulting waste of resources, [113]complicated even further by workforce shortages,[114] is a significant barrier to both regulatory compliance and to improved quality of care, the two most important stated goals of health care executives. Because a large share of health care resources is devoted simply to ensuring that patient health information is accurate and available, many practitioners view better HCIT systems as an opportunity for significantly improving health services while reducing costs. Improved HCIT can also promote other functions such as a culture of self-help and community support, where patients can access their own health data and become more involved in their own care.

A standardized, reliable and secure Electronic Medical Record (EMR) system has been a central and long-standing goal of these efforts. An average person's personal medical record is comprised of hundreds or thousands of data points, drawing in information from triage systems, lab reports, radiology, x-ray and imaging equipment, pharmacies, and hand-written diagnoses from doctors, nurses and other experts. In next generation HCIT systems, these need to be combined into a secure EMR. Noting both the need for such a system and its inordinate complexity, the American Academy

of Family Physicians writes: "[an EMS] is essential in increasing the quality of health care and improving patient safety and should contain detailed clinical notes; prescription ordering and management capability; a secure messaging system; lab and test results reporting; evidence-based health guidelines; secure and confidential patient access to health records; public health reporting and tracking system; mapping to clinical and administrative standard code sets; and the ability to interface with leading practice management software" (American Academy of Family Physicians, 2003).

The computerized systems that generate these growing piles of data are produced by a multitude of competing firms. Because these systems are developed independently, and because proprietary software development hides the internal workings of the software, the task of combining diverse data to a standardized, meaningful EMR is daunting. Efforts to develop industry and global standards for health care data management have been underway for some time, with limited success.[115] One major difficulty is that vendors perceive the data streams produced by their systems as potential revenue sources to be exploited by offering complementary services to their clients, rather than as elements of an integrated patient record, portable across institutional boundaries. Consequently, most HCIT deployments involve purchasing multiple modules from the same vendor, creating vendor lock-in and making integration of systems across different institutions difficult, if not impossible.

Regulators have worked to promote HCIT development and deployment, but have not addressed the market incentives that undermine progress on standards, or identified the ways in

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[112] A report by Health Grades Inc. (2004). "Patient Safety in American Hospitals." Finds that each year close to 200,000 people die in the US alone from potential preventable clinical errors.

[113] A study commissioned by the American Hospital Association and performed by consulting firm PricewaterhouseCoopers (2001) found that each hour of skilled nursing care results in 30 minutes of paperwork, while each hour of emergency department care generates a full hour of subsequent paperwork.

[114] For example, according to a 2002 American Hospital Association Workforce Study, 89 percent of hospital CEOs report significant workforce shortages. The shortages impact all areas of the hospital, but most prevalently affect nursing, radiology and pharmacy.

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[115] Most notably a protocol called HL7 developed by Health Level Seven which is a standards developing organization operating in the health care arena. Health Level Seven's domain is clinical and administrative data with a mission to provide standards for the exchange, management and integration of data that support clinical patient care and the management, delivery and evaluation of health care services. More information available at http://www.hl7.org

which F/OSS might alter that equation. The major regulatory act shaping HCIT development in general and EMR software design in particular is the Health Insurance Portability And Accountability Act or HIPAA for short, passed by Congress in 1996 (US Congress 1996). HIPAA targets a wide range of health care problems, from waste, to fraud, to abuse in health insurance and health care delivery. Among its key provisions is support for "the development of a health information system through the establishment of standards and requirements for the electronic transmission of certain health information."[116] For many health care providers and insurers, HIPAA implementation efforts require a focus on EMR software, including significant efforts to comply with the mandate that patient data be completely secured (e.g., behind a firewall) (HIPAA Frequently Asked Questions 2003). The challenge to HIPAA compliance arises from the diversity and complexity of HCIT systems, especially when they are expected to work together. Because is often not enough to test each system component separately, a more systematic approach to security and privacy is needed.

Leading F/OSS Projects in Health Care

To date, there is no complete open source HCIT system that can address all of these problems. However, several systems have been developed in recent years that clarify F/OSS's potential in the health sector. As in the proprietary HCIT market, there is significant diversity among F/OSS projects. This is both a strength in terms of capacity to innovate, and a persistent challenge in a context where standardization across the field generates value. The major projects—including those described below—operate largely independently from one another. Some are the works of visionary individuals, while others are long-standing, publicly funded efforts; some focus on creating open versions of existing HCIT systems while others emphasize new IT infrastructure; some target small, local clinics while others have the country's largest hospitals or even a national infrastructure in mind. A common denominator is that they all

seek to combine three traditional strengths of F/OSS to address HCIT concerns: (a) cost-effectiveness (b) increased standards of security (c) modularity and ease of customization. In addition, all go beyond the traditional 'recordkeeping' tasks of EMR to integrate infrastructure and applications that can support the needs of different categories of users, working toward a model of vertical integration that can address the complexity of health care work and information flows. All stress the importance of open standards and comply with efforts by the wider healthcare community to increase the adoption of such standards.

Compared with the F/OSS adoption campaigns in the server, database, and desktop arenas, where concerns about Microsoft have fairly wide resonance, the advocacy infrastructure around F/OSS HCIT is thin, limited primarily to IT and health care professionals, and to a few F/OSS-friendly public projects and agencies, such as the SPIRIT program within the European Commission's Fifth Framework for scientific research, the U.S. Department of Veteran Affairs, and the Centers for Medicare and Medicaid Services (CMS, which have been promoting F/OSS as an element of the long-awaited U.S. national health information network). In 2000, a group of health care and informatics professionals from the U.S., Canada, and the UK founded the Open Source Health Care Alliance (http://www.oshca.org/) to facilitate the needed networking and knowledge-sharing among F/OSS developers, public health agencies, institutional users, and other interested parties. These efforts have largely focused on arranging several workshops at large HCIT conferences and facilitating online communication among project leaders.

These advocacy efforts appear to be gaining some traction, especially among categories of health providers who are most disadvantaged by the existing commercial HCIT solutions. The American Academy of Family Physicians, which represents many small medical practices, recently made a commitment to F/OSS for its future electronic health records (EHR) systems. In its call for partners for its MedPlexus project, an EHR system for practices that cannot afford the multi-million dollar installations used by larger

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[116] Ibid, §261.

providers, the AAFP writes: "[An] open-source EHR will be designed to run on PCs, Macintosh, Linux, UNIX, Palm and PocketPC hand-held devices…Our ultimate goal is to provide an EHR that is low-cost; has a set of simple, uniform end-user interfaces; and will support a seamless, secure exchange of clinical data between health care providers, organizations, institutions and patients. The time has come to move from theory to action on this…" (American Academy of Family Physicians, 2003).

AAFP's goals echo those of many other F/OSS health care projects, such as Debian-Med, OpenEMR, OpenVista, OSCAR, and SPIRIT. These are targeted primarily at the North-American and European health markets, though in several cases their architecture and goals have broader applicability. These projects suggest something of the diversity in the field, and illustrate some of its important dynamics.

Debian-Med

Debian-Med (http://www.debian.org/devel/debian-med/) is a "Custom Debian Distribution" aiming to extend Debian (a leading Linux distribution) into an operating system suited to the requirements of medical practices and research. The Debian Project is an association of individuals who have made common cause to create a free operating system. Conceived by a few developers interested in 'free software in medicine,' Debian-Med was officially started in 2002 with the official goal of creating a completely integrated, free software solution for all tasks in medical care. Debian-Med markets itself specifically as a 'free software' project and not 'open source,' reflecting its commitment to the social ambitions of the Free Software Movement. The project is in the advanced stages of development, and includes packages that address all aspects of health care provisioning and research (including some aspects missing from other F/OSS projects like dentistry and microbiology). The first version of Debian-Med will reportedly be included in the next stable Debian release (codename 'Sarge'.) Debian in general, and Debian-Med in particular are primarily grass-roots projects driven by individuals in the F/OSS and health informatics fields.

OpenEMR

OpenEMR (http://www.openemr.net/) is a medical clinic practice management and electronic medical record application offered by the Pennington Firm, a private company specializing in Linux and open source software. The software is offered for free; the Pennington Firm provides support and customization services. The project emphasizes easy installation and cheap maintenance and operation—features that translate into lowered cost for its users. The software is reportedly stable, and has been embraced by several small, cost-sensitive providers. For F/OSS advocates, OpenEMR illustrates that the commercial F/OSS model of building a services firm can translate to the health care sector. There is some possibility that it will act as a bellwether for larger players waiting to see if the F/OSS model is sustainable in the field.

OpenVista

OpenVista (http://sourceforge.net/projects/openvista) is the open-source version of VistA—the largest integrated hospital software package in the world. Originally developed by the U.S. government's department of Veteran Affairs, VistA is used in veterans' hospitals, and has been in the public domain for years. Two separate entities have worked to expand VistA's utility and reach:

- WorldVistA (http://www.worldvista.org/), an organization founded to extend and improve VistA for use outside its original setting, notably through the development of packages for pediatrics, obstetrics, and other hospital services not present in veterans' hospitals; and

- OpenVistA, an effort to port VistA from an archaic proprietary operating system called MUMPS to Linux—and in the process reducing costs of operation. OpenVistA is supported by The Pacific

Telehealth & Technology Hui[117]a joint partnership of the Department of Veterans Affairs and the Department of Defense. It is considered the most developed and robust system of its kind and has been tested in large-hospital settings.

OpenVista illustrates a trend of open-sourcing proprietary or government funded projects as a means of attracting free developer support. By translating the software to Java and opening its code, OpenVista has been taken up by both commercial developers and the F/OSS community at large. Given the challenges of keeping such a complex software system up to date, this expansion of responsibility has proved both a virtue and a necessity. OpenVista has considerable support as a possible building block of the upcoming national health information infrastructure.

OSCAR

OSCAR or Open Source Clinical Application & Resources (http://oscarmcmaster.org/), is a web-based integrated electronic clinical record and resources system for use in primary care. The software, the brainchild of a Canadian health care professional and visionary, was initially developed by the Department of Family Medicine at McMaster University to address the requirements of the Ontario Provincial Government's Primary Care Reform Initiative— a multimillion-dollar initiative to transform primary care in the province. OSCAR's development benefited from its academic setting, which provided a setting both for collaboration on design and commitment to use from a range of health care professionals, technologists and end-users. This model proved successful enough to warrant OSCAR's expansion into a full-fledged EMR. As with OpenVista, OSCAR source code was eventually released for distribution in order to attract support from the development community. Project management has recently shifted to SourceForge.Net and OSCAR now enjoys contributions from developers around the world.

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[117] "Hui" is the Hawaiian word for partnership.

OSCAR is used in eight facilities in Canada with several planned U.S. and international deployments. Arguably, OSCAR is the most feature-rich and stable open source software of its kind.

SPIRIT

SPIRIT (http://www.euspirit.org/project.php) is a virtual community and meeting place that provides resources and services to help interested parties share information about projects, and to participate in health-care-related open-source developments. SPIRIT was partially funded by the European Commission's Fifth Framework Programme, which recognized the need to accelerate the uptake of F/OSS as an economically viable and effective alternative for the ailing regional health care system. Sponsored with public funds but managed by three private firms, SPIRIT aims to become a clearinghouse for open source software applications and components for both existing and future projects. Anticipated contributors include government agencies, medical teaching institutes, and a wide range of health care providers. Services include disseminating open source research results, groupware applications, audio/video conferencing facilities, mailing lists, and web site hosting for open source health care projects. The importance of this project stems not from the impact of it activities (which are limited to date) but mainly from the fact that it is one of the only projects to have received public funding specifically to promote F/OSS principles in health care.

The Politics of F/OSS Adoption in Health Care

The efforts surveyed above are all in late stages of development or the early stages of deployment. Despite the promise of these projects, F/OSS has a long way to go before it is fully accepted as an alternative to proprietary HCIT software. What are the obstacles to more rapid adoption?

A first barrier is legal. Although as I have argued elsewhere (David, 2004), F/OSS offers an improved concept of software accountability, in the sense of an expanded capacity and

willingness to solve problems, the highly-regulated, highly-litigious health care arena often requires strict concepts of liability. Decision makers generally seek complete prior assignment of liability in case something goes awry. F/OSS projects using the GPL, especially, do not provide this assurance. Because of the collective, open-ended nature of most open source development, no single entity claims authorship of the code. There are uncertainties as to the very legal definition of an open source community and its legal liability in case of software-related accidents.[118] Most F/OSS licenses aim to shield developers from strict liability in such cases (although this is as yet untested in the courts). Although other licensing options exist that can accommodate legal uncertainties better than the GPL, most of the leading projects have yet to adopt them. One way to change both the perception and reality of the liability problem would be for a large industry vendor to assume the risks and liabilities, offering end-users a legal safety net that stretches beyond the standard license clauses. So far, only IBM has made limited gestures in this direction, and not at the level of critical applications.

A second barrier is business-driven. So far, no commercial firm has proven that developing F/OSS applications for health care is a viable business endeavor on a large scale. Although there is little doubt that F/OSS can offer business opportunities in general, many of these opportunities rely on developing or repackaging reusable software infrastructure and/or selling 'free' software bundled with a combination of hardware and services. In health care, none of the existing large hardware and medical device vendors has exploited the possibility of leveraging F/OSS for increased hardware and services sales. As mentioned above, this is due in large measure to the dominance of business models that rely on the concealment of system internals in order to sell expensive bundled solutions. In the eyes of these vendors, openness is not an opportunity but a risk. It would seem

to be only a matter of time, however, before one or more of these companies recognize the F/OSS opportunity, much as IBM has done. We predict that large medical device companies will soon follow smaller firms in adopting the F/OSS model, and begin relying on F/OSS solutions to connect their devices and systems.

A third barrier is government policy toward F/OSS in health care, which is largely non-existent. The absence of policy creates confusion for would-be investors in F/OSS at two levels. First and foremost, does F/OSS comply with regulations regarding liability and privacy? Advocates claim it does, but this issue has yet to be fully explored. Second, without clear indications about the government's investment policy in F/OSS, the private sector is hesitant to foot the bill for the transition. This situation is changing, however. Following President Bush's recent call for a ten-year plan to develop a National Health Information Network (NHIN), the Department of Health and Human Services issued a request for information (RFI). One of its questions is, "How could the NHIN be established to maintain a health information infrastructure that: a. Evolves appropriately from private investment; b. Is non-proprietary and available in the public domain…" (U.S. Department of Health and Human Services, 2004). This RFI speaks directly to a potential policy that would favor F/OSS in the development of national IT infrastructure. If the same considerations are maintained in the follow-on request for proposals, F/OSS solutions will likely play a much larger role in the overhaul of the U.S. HCIT system. This new interest is driven largely by pressures from the Department of Veteran Affairs (VA) and the Centers for Medicare and Medicaid Services (CMS), which are considering variants of VistA and other F/OSS solutions to serve their immediate HCIT needs (Berwin, 2004). The VA's recent report, "Approaches to Make Health Information Systems Available and Affordable to Rural and Medically Underserved Communities" (U.S. Department of Veterans Affairs, 2004) highlights its successful strategy to develop high-quality EHR technologies that remain in the public domain.

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[118] It is important to note that the projects described above are offered under the GPL, and not under other licenses that have dealt in numerous ways with the liability problem (e.g. the QT license)

Conclusion

The projects surveyed above demonstrate that a variety of institutional and funding contexts can generate stable, reliable, secure and ready to deploy F/OSS HCIT solutions. Significant barriers remain for widespread adoption of F/OSS in health care but the traditional strengths of the F/OSS model (low up-front costs, modularity and ease of customization, and a high degree of security) are a good match to the growing needs of the health sector. Health care remains a promising vertical market for F/OSS adoption but a range of legal, business, and public policy barriers will have to be addressed. The combination of clearer public policy that valorizes F/OSS, technical and economic proofs-of-concept by grass-roots projects, and shifting financial incentives for big business are arguably all working in the same direction: F/OSS will play a major role in HCIT in years to come.

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