Free and Open Source Software in India: Mobilising Technology for the National Good

A thesis submitted to the University of Manchester for the degree of Doctor of Philosophy in the Faculty of Humanities

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Jasmine N. M. Folz

School of Social Sciences/Social Anthropology
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<td>Anna University K B Chandrashekar Research Centre</td>
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<td>BJP</td>
<td>Bharatiya Janata Party</td>
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<td>BMGF</td>
<td>Bill and Melinda Gates Foundation</td>
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<td>BPO</td>
<td>Business Process Outsourcing</td>
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<td>C-DAC</td>
<td>Centre for Development of Advanced Computing</td>
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<td>CPI (M)</td>
<td>Communist Party of India Marxist</td>
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<tr>
<td>DeittY</td>
<td>Department of Electronics and Information Technology</td>
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<td>FOSS</td>
<td>Free and Open Source Software</td>
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<td>FSF</td>
<td>Free Software Foundation</td>
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<td>FSF-I</td>
<td>Free Software Foundation India</td>
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<td>FSFTN</td>
<td>Free Software Foundation Tamil Nadu</td>
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<td>FSMI</td>
<td>Free Software Movement of India</td>
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<td>FSMK</td>
<td>Free Software Movement of Karnataka</td>
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<td>GLUG/LUG</td>
<td>GNU/Linux User Group</td>
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<td>GPL</td>
<td>General Public Licence</td>
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<td>ICTD</td>
<td>Information and Communication Technology for Development</td>
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<td>IIT</td>
<td>Indian Institute of Technology</td>
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<td>IP</td>
<td>Intellectual Property</td>
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<td>ISP</td>
<td>Internet Service Provider</td>
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<td>IT</td>
<td>Information Technology</td>
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<tr>
<td>MeitY</td>
<td>Ministry of Electronics and Information Technology</td>
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<tr>
<td>Abbreviation</td>
<td>Full Form</td>
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<tr>
<td>MNC</td>
<td>Multinational Corporation</td>
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<td>NASSCOM</td>
<td>National Association of Software and Service Companies</td>
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<td>NRC-FOSS</td>
<td>National Resource Centre for Free and Open Source Software</td>
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<tr>
<td>OBC</td>
<td>Other Backwards Castes</td>
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<td>OSS</td>
<td>Open Source Software</td>
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<td>OSSI</td>
<td>Open Source Seed Initiative</td>
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<td>PPST</td>
<td>Patriotic and People Oriented Science and Technology</td>
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<tr>
<td>SC/ST</td>
<td>Scheduled Castes/Scheduled Tribes</td>
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<tr>
<td>SFLC</td>
<td>Software Freedom Law Centre</td>
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<td>TRIPs</td>
<td>Trade Related Aspects of IP Rights</td>
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<td>VC</td>
<td>Venture Capital</td>
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<td>WTO</td>
<td>World Trade Organisation</td>
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Abstract

This thesis, based on ethnographic fieldwork in India, explores how Free and Open Source Software (FOSS) is mobilised by individuals, the government, NGOs and the private sector in efforts to improve the lives of fellow citizens. As such, FOSS in India must be understood as a nation building project and can be considered an inheritance of Swadeshi, Gandhi’s call for India self-rule via home grown craft and technology. This is not to say that those who work to create and utilise FOSS in India do so as an explicit extension of Gandhi’s legacy, though some do. Rather, the Indian FOSS community envisions this software as a way to develop the nation in particular moral and material ways and underlying their efforts is an assumption/belief that material development must be understood in moral terms. Further, Swadeshi heritage has to be understood as the corollary to the colonial legacy and the contemporary Indian FOSS movement entails complicated relationships with postcolonial entities as well as contradictory goals within the community.

Using both pragmatic and idealistic arguments, Indian FOSS advocates, who are predominantly members of the middle class, push for changes in technology policy and practice at local, regional and national levels. The most common activity of the Indian FOSS community is not the creation of FOSS but its “evangelism.” Members of the Indian FOSS community evangelise the merits of this technology to engineering students, policy makers, and the private sector. As such, FOSS is mobilised towards a particular ideology of the national good, and this ideology is valued as much as if not more than technical practices of actually creating FOSS. This study explores how the ideological project of FOSS imagines ideas of the national good as well as the ways in which it melds with traditional Indian middle-class values. Despite a sincere commitment to freedom and openness as technical and philosophical tenets, the Indian FOSS community also demonstrates limits to freedom and openness by reproducing hierarchies in class and gender.

Although efforts of members of the Indian FOSS community have resulted in the adoption of pro-FOSS policies at the national level, relatively little FOSS is actually produced or used in India. Several hurdles to widespread adoption are explored. One challenge to implementing FOSS in government and industry is that the Indian government and software industry must balance desires for technological autonomy with the need for jobs from multinational corporations via outsourcing and development aid from NGOs including the Gates Foundation, with its ties to Microsoft.

By attending to the sociological aspects of the FOSS community as well as the wider political, economic, and historical contexts of technology in India this study demonstrates that FOSS in India represents both similar and different concerns than it does in the West, where it was first developed. In so doing this thesis shows the value in including such contexts in the analysis of technologically concerned communities that benefit and expand the anthropology of FOSS not only in other developing nations, but in the West as well.
Declaration
No portion of the work referred to in the thesis has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning.

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suggestions in this iteration of the research, future publications will include the products of what was an intellectually stimulating and even fun viva.

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Chapter 1 – Introduction

This thesis is about how free and open source software in India is mobilised in efforts that can broadly be understood as nation building. However, I will begin by sharing a pivotal moment in Indian history. In 1954 India’s first Prime Minister, Jawaharlal Nehru, made a speech inaugurating a large hydro-electric project in Himachal Pradesh, the Bhakra-Nangal Dam. In this speech he marveled at the scale and potential of this project before saying:

As I walked round the site I thought that these days the biggest temple and mosque and gurdwara is the place where man works for the good of mankind. Which place can be greater than this, this Bhakra-Nangal, where thousands and lakhs of men have worked, have shed their blood and sweat and laid down their lives as well? Where can be a greater and holier place than this, which we can regard as higher?¹

This speech was the basis of attributing the phrase “dams will be the temples of modern India” to Nehru. Although technology has never replaced religion in India and Nehru later tempered his enthusiasm for large-scale industrialization projects, his sentiment that the nation’s development was to be through modern technology remained with him and with many more Indians besides. Significantly, and understandable from a postcolonial perspective, self-reliance was a key attribute of India’s post-Independence development strategy. This is not to say that Western knowledge and technologies were not taken in and appreciated (they were) or that Nehruvian development has not been criticised (it has); rather, one must appreciate that post-Independence nation building was premised upon figuring out how to use technology to meet the nation’s needs, but on Indian terms. How, though, does a type of software which made it to India in the 1990s fit into this narrative?

A useful way to conceptualise software is as “words that do things” (Austin 1975). In this analogy the zeros and ones which underlie all software are “words” and when they are composed in certain ways, the words make up a language or “source code” that can do certain things on computers. Like any language, these words can be modified to do other things or the same things better. All software was originally free and open source, meaning the source code did not cost anything and was modifiable by anyone who knew the language. From the 1970s some companies, like Microsoft, began disallowing access to source code, copyrighting and selling the software as a proprietary product independent from the hardware it is used on. Despite, and

perhaps even because of, the global domination of proprietary software, free and open source software (FOSS) has become a space where technology, economics, and politics have merged and re-emerged as a political and economic issue, particularly in developing countries. Software development and policy in India offers an excellent lens through which to understand how this technology can be used as a nation building tool because it able to simultaneously redefine citizens’ relationships with each other and the state and the state’s relationship with the market.

Today India is the world’s largest democracy and yet, despite its fast-growing economy, there are still vast social and economic inequalities. Because it offers technical flexibility, low to no cost, and aligns well with the ethical imperatives of Indian engineers who wish to make social as well as technical contributions to society, FOSS is seen as a tool that can be used to help ameliorate some of these inequalities. Of course India is not the only country that is taking the potential of FOSS seriously; developed nations including the United States and members of the European Union are all using FOSS to varying degrees but developing nations may be taking the lead, most significantly Brazil, China, and South Africa. Indeed, the United Nations has taken up FOSS as an issue that highlights national autonomy and ingenuity, noting in a 2003 report on e-commerce and development that not only does governmental use of FOSS mitigate many costs; its inherent modifiability provides avenues for software proliferation and education to many who use only so-called “exotic” languages. The report emphasises the suitability of FOSS for government use not only because it reduces costs and dependence on corporations for necessary services but also because FOSS introduces a diversity of code, it offers a more secure technology for keeping public records and data safe (2003: 111). The report also suggests that because FOSS is likely to foster home-grown talent it can prevent the “brain drain” problem many developing nations face (2003: 110).

This project explores how citizens and the government are harnessing FOSS to improve and in some ways redefine India and asks: What can the case of FOSS in India tell us about the roles of and relationships between technology, autonomy, and the state?

The short answer is that FOSS in India must be understood as a nation building project. As such, FOSS can be considered a descendant of Gandhian Swadeshi, a call for India self-rule via home grown craft and technology. This is not to say that those who work to create and utilise FOSS in India do so as an explicit extension of Gandhi’s legacy (though some do) but, rather, the Indian
FOSS community envisions FOSS as a way to develop the nation in particular moral and material ways and further, that material development must be understood in moral terms. Of course, this Swadeshi heritage has to be understood as the corollary to the colonial legacy and the contemporary Indian FOSS movement entails complicated relationships with postcolonial entities and contradictory goals within the community, which brings me to the long answer, contained within this thesis.

Before embarking on the long answer to my question the question itself must be contextualised. This introductory chapter will begin by demonstrating some of the unique ways in which nation building with FOSS is approached to address social as well as technical problems before I provide an overview of what software is and how other anthropologists have approached FOSS. I will then explore how freedom is imagined differently in India than in the US where FOSS originated and discuss why this difference is crucial for understanding FOSS as a tool for nation building in India. I will also unpack key terms I employ in the thesis. Finally, I will discuss the fieldwork and ethical considerations before providing an outline of the thesis.

**Development with a Small d**

The ways in which FOSS is mobilised are diverse but they are all connected in that even among disparately situated actors, there is a common concern that this technology has great potential to develop India’s educational institutions, the government, and industry. These are all well-established routes to national development. However, in addition to the many pragmatic applications for FOSS, it has also been mobilised for use in small-scale community projects that prioritise social over technical goals. In this way, FOSS has been appropriated as a social tool that dovetails seamlessly into traditional charity work, or what Baviskar calls “development with a small d.”

On a Sunday morning in October I sat with about twenty free software enthusiasts at the Free Software Movement of Karnataka (FSMK) office in central Bangalore talking about their experiences at college and in the workforce. Most were new to FOSS but there were a few veterans who spent much of their free time engaged at various efforts to bridge the digital divide or just support local students. When I asked Champa, a young woman with a full time job in the IT sector, what motivated her to spend so much of her time volunteering for various social and technical projects sponsored by the FSMK, she explained that once she realised she was able to
change and improve the software she and other people used, she felt personally responsible for
doing so whenever she could. She added that because, by design, free software makes her feel
more personally responsible for fixing and/or improving it for herself and others that this feeling
naturally extends to social issues as well and thus leads to social activism. Everyone in the room
nodded in agreement. While the path from free software to personal to social responsibility may
have been a natural path for her and many of her compatriots, the ties between technology and
responsibility are not universal and do not necessarily always lead to the same place. In this
section I will trace how FOSS activists have been able to seamlessly incorporate this cutting
edge technology into a tradition of middle class charity work.

During the course of fieldwork many people told me that FOSS was in fact very Indian because
both its technical and philosophical tenets mesh well with Hindu philosophy. It is not within the
scope of this analysis to confirm or contradict this claim but that the claim was made repeatedly
does need to be addressed. Singer (1972) found in his research on religious and cultural practices
in 1950s Chennai that rather than moving from traditional to modern (Western) practices that
“worldly Brahmins” integrated newer ideas and technologies and in so doing “traditionalised”
them. Examples of this integration included neon lights in temples and the incorporation of
Western medicine with Ayurvedic medicine (Singer 1972:140–141). Over half a century later my
key informant, Karthik, made the same observation.

One afternoon we were having chai in his office and I told him I was frustrated that Uber drivers
do not always trust the electronic maps on the Uber app but prefer to be given a landmark, which
as an outsider I do not always know. He told me that India takes in technology and ideas but then
blends them on a contextual basis to fit current needs. He gave the example of Indian farmers
who on paper look to be using a lot of pesticides but in reality use local knowledge to use
pesticides in different ratios depending on area and need. He then told me that all Indians use
integrated medicine – they will get a prescription for Western medicine but also use Ayurvedic
medicine and perhaps others as well. In this way Indians express autonomy by incorporating
whatever is good from outside with their own knowledge. This also ensures that there are always
multiple ways to solve a problem because one is not too dependent on any one system. So, it is
not that google maps are not perfect in India yet, it is that they never need to be because they are
never going to be relied upon exclusively.
The case for Indianising FOSS was made by another of my key informants Ramakrishna, a retired scientist. After we completed an official interview, he made us filter coffee and we chatted about the political nature of FOSS in India. He told me that FOSS fits into an intrinsically Indian cultural trait of sharing knowledge and helping those less fortunate and that this aspect of Indian culture is in conflict with Western capitalist goals of self-interest and profit. Conversely, some of my informants were adamant that FOSS is FOSS no matter where it is, though most did acknowledge that the Indian FOSS community was unique. Considering the traditionalising tradition in India it makes perfect sense that FOSS can be appreciated by my informants as, on the one hand, a universal technology that connects them to all other FOSS practitioners internationally and, on the other hand, as a very Indian way of doing software and using it for social change. To better understand the Indian-ness of using FOSS as a social tool we will now examine how ideas of the deserving poor are mobilised by the middle class.

Caplan demonstrates how medieval gifting practices of the Indian monarchy have evolved into philanthropy started by Europeans in the colonial period that is still practised today by middle class Anglo-Indian Christians in Chennai (1998:410). Caplan found that it is important to benefactors that recipients of their charity are worthy, i.e. people who are somehow unable to care for themselves such as children, the elderly, and the disabled; those with “bad habits” such as drinking are not considered suitable (1998:417). Although the recipients of charity obviously benefit from material help, Caplan found that the philanthropists, despite sincere desire to help, also benefit from the charitable interaction in the form of increased prestige within the wider community and that this kind of status is not isolated in the Anglo-Indian community but is an aspect of South Indian charity work more broadly (1998:422).

The charitable work conducted by middle class Indians often functions to help those who are left out by the state and NGOs, those who don’t qualify for what Baviskar terms the “politics of recognition” (2012:138). As Caplan’s example shows, Indians have a long history of trying to fill the gaps left by the state by performing small development projects within local communities. Of course this sort of development is dependent on a community of people with the time, resources, and inclination to help those less fortunate and, since these people are beholden only to their conscience (as opposed to government or NGO organisation which are at least on paper accountable to a higher power), they get to decide who is deserving of help.
I would now like to return to the young FOSS activist discussed at the beginning of this section, Champa, who discussed how free software led her to feeling personal responsibility for ensuring technology works and how that, in turn, led to her feeling social responsibility to help others both in terms of introducing them to free software and more generally. Following from Singer’s observations of traditionalising to the insights of my informants about the “Indian-ness” of FOSS, and a middle class which has historically filled in gaps of social need, that path does now appear natural. Champa has grown up in a middle class culture that puts value on helping those who are less fortunate, so long as they are worthy. Since she was introduced to FOSS as a university student and learned from its moral-technical philosophy that she can and should take responsibility for improving code it follows, to her, that she spends her free time leading others to this same path. Further, she feels it is important to help the children at a local community centre in a slum. And although helping these children is done under the guise of free software the help itself is both practically and symbolically about addressing social inequalities. Several of my informants work for NGOs in technical and leadership capacities which directly or indirectly address the digital divide, however the majority of FOSS activists participate in this style of small d development orchestrated by a segment of the middle class.

**What is software and what makes it free?**

Before delving more deeply into the world of FOSS it is perhaps prudent to give an overview what, exactly, FOSS is. Software, even when understood as words that do things, is still a language that is difficult to comprehend for those who are not familiar with it. Very basically, when you sit down at a computer to work on a document or browse the internet the *programs* you use to surf the net, play a game, or create a document are software *applications*. These applications that you can actually see and interface with are the “top layer” of your computer’s software. Below this layer is your *operating system*, for example Microsoft Windows, Mac, or Linux. The operating system is the platform that supports the applications and works with the *hardware*, the physical computer. The operating system is also made of software. All software is composed in various languages that speak to the computer through a kind of interpreter called a *compiler* that turns the language we compose software in into the binary code of zeros and ones that the hardware understands. It is to the ways and means of creating the software that tells your hardware what do that we now turn.
As computing machines (hardware) became more and more powerful from the middle of the twentieth century, the language needed to communicate to and through the machines has become not only more powerful in what it can accomplish but also more complex and diverse. In fact, what we now know as software code was originally mnemonics, literally codes that were written on sheets of paper that would then get “coded” or punched into a card or piece of tape and fed into a large computer. Significantly, this early coding work was considered low-level women’s work (Ensmenger 2015). By the 1960s computers were being used for increasingly complex and specialised functions for pure research as well as for the military industrial complex. Until and even after 1969, the people who worked with computers created and shared the specific software languages needed to do specific tasks on specific machines; indeed software came free with computer hardware, which was considered the important part of a purchase. In 1969 the US Department of Justice forced IBM, a very powerful technology corporation, to unbundle its products – i.e. software from hardware – via an anti-trust suit (United Nations 2003: 99). When IBM began to sell its software without the hardware and without the source code a new product and market were created.

During the same time software was becoming a product in its own right at IBM, the research scientists at AT&T Bell Labs were working in conjunction with the Massachusetts Institute of Technology (MIT) to figure out a way to standardise software language so it could be used, improved upon and made more robust and portable to more types of machines and users. From this corporate/academic liaison, which was never quite one or the other, came UNIX (Kelty 2008: 119). This operating system was written in a new software language “C” and was immediately successful because it worked better than any other software then on the market; without a doubt it was the inclusion of the source code free with purchase that really made UNIX the precursor for the FOSS movement as:

The practice of distributing the source code encouraged people to maintain it, extend it, document it – and to contribute those changes… as well. By doing so, users developed an interest in monitoring and supporting the project precisely because it gave them an opportunity and the tools to use their computer creatively and flexibly (Kelty 2008: 128).

However, even as UNIX was providing the space and means by which to contribute to the development of software by academics and working engineers alike during the 1970s, in 1975 Bill Gates and Paul Allen founded Microsoft based on the idea that software in and of itself can
be created, marketed and sold for profit. Likewise, Apple was founded in 1976 but with the difference being that the software would be bundled with the hardware. Neither company allowed access to its source code and, as such, any problems or “bugs” in the software had to be handled in-house and then fixed in the next release of the software.

By the 1980s some software engineers were becoming frustrated with proprietary software in terms of its price and the inaccessibility of its source code for tinkering in order to fix bugs or improve the program. In an effort to circumvent the problems he found inherent to proprietary software, in 1983 MIT researcher Richard Stallman used UNIX to create GNU software (GNU stands for “GNU is Not UNIX”) which is free to acquire and the source code was open to view and edit. Stallman also founded the Free Software Foundation (FSF) to promote and provide access to software that was free from proprietary copyrights via the GNU General Public Licence (GPL) which is a “copyleft” licence the FSF defines, in part, as:

…the GNU General Public License is intended to guarantee your freedom to share and change all versions of a program--to make sure it remains free software for all its users. …When we speak of free software, we are referring to freedom, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for them if you wish), that you receive source code or can get it if you want it, that you can change the software or use pieces of it in new free programs, and that you know you can do these things. To protect your rights, we need to prevent others from denying you these rights or asking you to surrender the rights. Therefore, you have certain responsibilities if you distribute copies of the software, or if you modify it: responsibilities to respect the freedom of others. For example, if you distribute copies of such a program, whether gratis or for a fee, you must pass on to the recipients the same freedoms that you received. You must make sure that they, too, receive or can get the source code. And you must show them these terms so they know their rights. Developers that use the GNU GPL protect your rights with two steps: (1) assert copyright on the software, and (2) offer you this License giving you legal permission to copy, distribute and/or modify it…

As is evident in this description of the GPL there are different meanings of “free,” meanings which are often short-handed to “free as in speech not free as in beer” or “libre not gratis.” Significantly, by using the language of rights and responsibilities Stallman (and most other FOSS enthusiasts) conceptualise FOSS and the licences they created to keep it free and open as more than a technology; they also consider FOSS to be a philosophy. Though Stallman and the FSF are committed to using free software to promote socio-economic equality their main usage of the

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term free is as in free speech; they are not fundamentally opposed to using software or software services to make money so long as the software itself is free in terms of accessibility, modifiability and re-use. However, there is a parallel movement for “open source” rather than “free” software that is rooted in technical rather than moral arguments, namely that the principles of the “bazaar” style open source production model which entails coordinated community contribution will produce better, more robust software than the “cathedral” style top-down production model associated with proprietary software (Raymond 1999). The philosophical differences between these camps will be explored in the thesis but it is important to note that both camps often work on the same projects but with different philosophical understandings about the wider implications of free and/or open source software.

It is not an exaggeration to say that Stallman’s intervention has resulted in a sea change in how software is created and used. No longer is the top-down hierarchy the only or main design strategy. Now collaborative communities which include volunteer and paid labour run a majority of the applications used globally. In 1991 a Finnish graduate student named Linus Torvalds was working on a version of UNIX and he sent out a request for others to contribute to his “little” project. This project was the ‘kernel’ of what would become Linux (Linus + UNIX), an operating system which is arguably the most influential FOSS project to date. Since the launch of Linux, several companies have formed around Linux by forking Linux, which means taking a copy and creating a separate and distinct version (called a distribution), some of the most successful being Red Hat, Debian, and Ubuntu, all of which offer their version of the Linux operating system for free but charge for customisations and support services. During the growth and diversification of FOSS projects and applications it is important to know that Microsoft vehemently fought this movement with arguments against FOSS’s technical merits. Nevertheless, by the late 00s, in addition to a variety of Linux based operating systems, a number of FOSS licences were now available which offered varying levels of freedom and responsibility with regard to how the software can be used when it comes to commercial applications. In 2008 GitHub, a repository for code and projects was launched. GitHub has since become one of the most important spaces in the international FOSS community because it offers access and opportunities to contribute code for countless FOSS projects. Another key development in FOSS technologies has been the dominance of the Android operating system for smart phones. And, finally, the ascendency of FOSS has been acknowledged by Microsoft. In 2016 Microsoft opened up the source code for
some of their projects and in 2018 they purchased GitHub, both moves which more than imply that the company now acknowledges the technical merits of FOSS.

The Anthropology of FOSS
To date, the anthropology of FOSS has been dominated by research with mainly Western FOSS practitioners. Coleman and Kelty represent the most prolific output and much of their analysis has centred around FOSS in the American context. Particularly, the two major issues that come out of the American experience are: how to understand the norms and goals of the FOSS community and the legal implications of FOSS, especially with regard to intellectual property law. Much of the research on FOSS in the American context also addresses potential politics of this technology.

Coleman (2001) documents how FOSS enthusiasts, whom she refers to as “hackers,” operate in guild like groups in order to protect software workers’ “right” to openly access and create source code and documentation, providing an avenue for collective action among high-tech workers. Coleman is careful to stipulate, however, that the efforts of these hackers cannot be accurately viewed as political resistance, rather, that “…the moral economy of the movement in general can neither be understood as a simple moral crusade against capitalism nor a reification of it. It provides a qualified means by which participation in the market is best carried out” (2001: 31). Coleman further stipulates the hacker community of FOSS advocates is “politically agnostic” and that, although FOSS has wider socio-political implications, hackers feel “…the fact that anyone can use FOSS and that it can be directed towards economic, political, and personal ends is a positive side-effect of openness; they consider it a testimony to the power of a neutral political commitment” (2004: 150). These wider implications and the avowed refusal to explicitly commit to them are also present in Kelty’s ethnography of free software as culturally significant.

Kelty uses the concept of a “recursive public” defined as “…a public that is constituted by a shared concern for maintaining the means of association through which they come together as a public” to explore the relationships between people who create and advocate for free software, who he refers to as “geeks,” and the Internet as a public sphere (2008: 28). In so doing, he sets up his analysis of FOSS within the technical and moral arguments of the people who create and maintain the recursive public; he found that this community has many ideologies but ideas are
only made meaningful to the community through the *technical practices* of creating FOSS. Leach, Nafus and Krieger further these analyses by postulating that the moral/technical valuation system is naturalized in three distinct ways: first, the binary code of computers affects the ways in which coders see “right and wrong,” secondly, moral judgements about code are based in aesthetic judgements about its “natural” elegance, and finally, “…the aesthetics of code generates a conception of future potential that in turn makes the activity of writing code a version of exploring and opening up physical and mental frontiers” (2009: 58).

Though American FOSS advocates are generally not willing to align their FOSS activities to an explicitly political process they are more than willing to use existing political structures, particularly the legal system, to advance the ends of FOSS. Kelty demonstrates how ideas about openness are translated into clever circumventions or “hacks” of American intellectual property law that enable the sharing of technologies and ideas through a tool of proprietary software: the copyright. Beginning with the GNU GPL discussed above, FOSS advocates have turned the intent of copyrights, to protect private property, whether it be physical or intellectual as in the case of software, into a way of allowing open collaboration and reuse of software. Coleman (2012) extends Kelty’s analysis with her exploration of how hackers use their technical and legal skills to define FOSS as free speech, arguing code is a form of speech and thus should not be owned. These insights into the production and (social) reproduction of FOSS within a unique morally and technically defined community are certainly necessary for understanding how Western FOSS advocates create and understand their life worlds. Yet, one is left with the distinct feeling that these insights, as useful and nuanced as they are, do not adequately explain what FOSS means outside the context of its creators.

Although the anthropological research to date on FOSS acknowledges and includes the global nature of FOSS development, much of it focuses on legal issues of intellectual property law, which are mainly situated in North America and Europe. What makes FOSS development and policy in India (and other developing nations) so fascinating is that it demonstrates how technology is being used to redefine, if not necessarily resist, both engineers’ and nations’ relationships with the market. Chan’s (2004) analysis of how a Peruvian legislative bill favouring FOSS as a self-determining resistance to Microsoft’s (expensive) monopoly on state infrastructure drew the attention of Bill Gates himself. The case gained international attention
when the correspondence between the politician who sponsored the bill and the head of Microsoft Peru were made public. Peruvian FOSS advocates actively sought government partnerships as a means to strengthen the sovereignty of the state, which to their Northern brethren “…not only seemed to be a weak rationalization for a technology’s use, but threatened to pollute more ‘legitimate’ technologically-based justifications for free software’s adoption” (2004: 534). Although Microsoft eventually changed their approach to the Peruvian state and even the original advocates approved of this new approach which pumped money and technology into the country, the case is an excellent example of how the same technologies can be understood and mobilised towards different moral and political ends in different political and economic contexts. In fact, why should FOSS be different from other technologies? Noting the different approach to software in the global North and South Chan observes that the Peruvians “translated the general principles of free software from focusing on individual consumer freedoms to emphasizing collective social rights, where citizens bore the right to access, understand, and reworked public institutions” (2004: 539-540).

**Individualism, Freedom, and Autonomy**

As the preceding discussion has made clear, the concept of freedom is integral to how FOSS is conceived and mobilised. Coleman particularly traces the conceptual lineage of freedom espoused by American free software enthusiasts to its roots in liberalism, which she understands as principles including “protecting property and civil liberties, promoting individual autonomy and tolerance, securing a free press, ruling through limited government and universal law, and preserving a commitment to equal opportunity and meritocracy” (2012: 2). Her ethnography shows that although FOSS is born from liberalism, its relationship to liberalism is complex: FOSS uses one tenet of American liberalism, free speech, to question another, intellectual property law. Both of these liberal tenets are integral to American individualism. Free speech is enshrined as the first amendment of the American constitution and intellectual property law, premised upon classic liberal economic theory which assumes individual actors will produce more (intellectual) goods for the market if they can own the rights to such goods. Thus, to

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3 For example, Ekholm (1946) has shown that wheels were used to make children's toys in Mexico prior to colonial rule showing that while the design and utility of wheels were obviously known, they were not used for transport vehicles demonstrating that a technology in and of itself does not change modes of production and/or socio-economic structures.
understand what American FOSS enthusiasts mean when they say “free as in freedom” it is to
also necessary to understand American individualism.

American individualism is utilitarian (Celinska 2007) and premised on a core value of self-
reliance (Hsu 1953) which negates the influence of family and class and minimises
responsibilities to society at large. Of course, Americans are embedded in social relations but
they are less likely to understand their positioning as such and this perceived positionality frames
how many Americans understand freedom through the language of rights and responsibilities
within a liberal ideal of singularity. However, not all Americans embrace utilitarian
individualism to the same degree. While there are many who will blame themselves for not
succeeding in a socio-economic system which is inherently unfair (MacLeod 1995) those who
are most likely to have individualistic attitudes are those who feel their relative success was
earned, even if they started life with every advantage. For example, Celinskia found in her study
of how individualist versus collectivist attitudes shape American’s views on gun regulation that
it was those who are socially most dominant, that is educated white men with high incomes, who
were the most likely to be individualists (2007: 240). When it comes to American software
engineers, who are also predominantly educated white men with high incomes (Folz 2009: 60-
61), individualism is also strong. Merit, especially, is invoked by American engineers as a
foundational belief that any individual who is smart enough and works hard enough can succeed
in engineering. Indeed, Coleman notes the emphasis her informants place on meritocracy, as
expressed in an individuals’ ability to contribute good code, as a prerequisite to participation in
free software (2012: 121). All of this is to say that when American FOSS enthusiasts say “free as
in freedom” they are invoking ideas of freedom based on their interpretation of constitutional
rights which are premised upon ideals of utilitarian individualism and self-reliance which are
expressed as a commitment to meritocracy, which, in turn, is measured by technical proficiency.

The different approaches to mobilising FOSS in India versus the United States can, to a large
degree, be understood as different relationships between freedom and individualism. Of course,
just as Americans are more socially embedded than they may recognise, Indians do not always
act as strict collectivists; however, the tropes of individualism and collectivism are powerful folk
ideologies which are valorized and/or reacted against. The debates over if or to what extent
Indians express individuality are not new and centre on assumptions that individual concerns are
subsumed in a collectivist hierarchy (see, for example, the Dumont/Beteille debates (1987)). Recent studies have complicated assumptions of a neat divide between Western individualist/Eastern collectivist models. Mines collected life histories from a diverse group of south Indians and found that, despite the power of family and caste hierarchy, that there is appreciable room for individual autonomy once an individual has reached middle age and acquired enough status to pursue personal goals outside of or even against social norms (1988: 577). In a comparative study of individualism-collectivism orientation amongst Indian and Irish high-tech workers, Ramamoorthy et al. found that while the Indians in their sample were generally more collectivist with regard to individual work goals there was no difference between Irish and Indian respondents with regard to self-reliance and that Indians were more competitive than their Irish counterparts (2007: 198-199). What these studies make clear is that although hierarchy is a significant influence it does not preclude individualism. To make room for an Indian individualism I approach the subject using Durkheim’s understanding of moral individualism, which in contrast to utilitarian individualism explicitly situates individuality within social relations wherein “...individualism thus understood is the glorification not of the self, but of the individual in general” (Lukes 1969: 24). For Durkheim, the moral individualist understands themselves as part of a community with shared beliefs and practices and, more than this, the moral individualist’s personal duties and desires are bound to the collective. By ensuring the goals of the collective are met, the rights of the individual as an ideal are protected. Understanding individualism as relational also opens up how the concept of freedom is articulated in the Indian context.

Freedom is rarely used by anthropologists as a conceptual tool. Indeed, although freedom is flagged as foundational for the conceptual practice of creating FOSS it is not indexed as a conceptual category in any of the ethnographies of FOSS. Freedom as an analytic concept has gained some traction in connection with the ethical turn (e.g. Laidlaw 2002) but, as Sopranzetti points out, the recent anthropological interest in freedom has been more theoretical than ethnographically grounded. Sopranzetti suggests that the relative lack of anthropological interest in freedom as a concept can be understood as anthropologists’ not finding the tenets of what he calls freedom with a capital F, i.e. “a universal and absolute category that stands in opposition to control, as its archenemy and not its ally” apparent on the ground (2017: 84). To rectify this
mismatch he suggests embracing *freedoms with a small f*, which he says “always develop against a local experience of unfreedom and are therefore much more entangled in the complexity of people’s experiences and political-economic transformations” (2017: 71-72). While there have been surprisingly few cross cultural comparisons of freedom, the studies conducted have shown that freedom, like individualism, must be understood as the product of unique cultural histories. Tracing how Russian terms for freedom have been shaped by political history and what being the member of a community or state means, Humphrey demonstrates how the concept of freedom is significantly different in Russia than in the US or UK; although the meaning is translatable, the associations with the concept are not necessarily positive (2007). In his analysis of motorcycle taxi drivers in Bangkok, Sopranzetti (2017) shows how the concept of freedom is mobilised by the taxi drivers to explain why they prefer their precarious employment over factory work despite the unstable and dangerous nature of the work.

Taking that neither individualism nor freedom are universal concepts we can now unpack how it is that so many Indian FOSS enthusiasts can, on the one hand accept that “free as in freedom” is the foundational underpinnings of FOSS philosophy and, on the other hand, emphasize the importance that FOSS is also “free as in beer.” Because Indian FOSS enthusiasts conceptualise individualism as inherently relational, their interpretation of FOSS philosophy and its implications include but expand beyond the individual. Thus the “freedom imagined” (Leach et al 2009) by the Indian FOSS community includes the wider socio-economic potential FOSS holds for their developing nation, to which they feel morally obligated to contribute to, as individuals. The community work being done in the name of FOSS discussed earlier in the chapter fits quite easily into this conceptualisation of freedom which includes social responsibility. The related but distinct concept of autonomy is key to understanding how freedom is imagined and enacted in India.

Freedom and autonomy are often used synonymously yet here I would like to explore their subtler particularities to better situate this research. In this thesis I argue that the concept of autonomy is integral to how FOSS is conceived and mobilised in India. The concept of freedom is tied to ideas of individuals and their freedoms from something or to do something and freedom is also tied to the language of politically granted rights. Autonomy is analogous to freedom but is more concerned with sovereignty or self-rule of individuals or states. While either term can be
applied to individuals or states freedom is generally more about individuals and autonomy is often associated with sovereignty. Within the postcolonial context autonomy is particularly significant. Indeed, moving beyond the case of FOSS we can note that India’s self-conscious cultivation of autonomy has been reflected in its commitment to political non-alignment and internal technological production (both of which will be discussed in the following chapter). Of especial interest to understanding how FOSS is representative of efforts for national autonomy are the parallel movements to ensure non-proprietary seeds and pharmaceuticals are made available to citizens (e.g. Sunder Rajan 2006; 2011; Srinivas 2006) which will be discussed in final chapter. In sum, while individual self-reliance is not a traditional cultural touchstone in India, national self-reliance, as reflected in the Swadeshi movement and post-Independence political and economic policy, is.

Some notes on terminology

FOSS v Free Software/Open Source Software
I am using “FOSS” throughout the thesis as an umbrella term to describe free and open source software but do want to acknowledge that many FOSS advocates deliberately choose different semantic articulations of their ideas and goals as they pertain to software. For example, some prefer the term free software whereas others use the term open source software (OSS). Still others choose the term “libre” as the precursor to open source software (LOSS). It is also common to see the moniker F/LOSS in acknowledgement of all possible names for this technology. These differences are not trivial to the community and will be discussed throughout the thesis but shifting back and forth between terms in the context of this thesis would not serve to provide extra clarity whilst reading. FOSS is a term that covers most of the bases well enough to be acknowledged by everyone across the spectrum so I am using it during all general discussion of the technology. However, when I am discussing a particular person’s ideas about software I will adhere to their articulation to remain consistent with their views.

The Indian FOSS Community
The term “FOSS community” is used in most social science discussions of people who care about and contribute to the technology (Anderson-Gott et al 2012: 106; Leach et al. 2009: 55-56; Raymond 1999: 20-21). Leach et al. make a point to clarify that they use the term “community” not because it necessarily fits under a strict sociological definition as such but because “…the idea that F/LOSS is a community is an ideological component of the social form that is F/LOSS”
Acknowledging that the sociological concept of community may not be strictly applicable but that it is meaningful to those who participate in FOSS, I too use the term FOSS community to discuss FOSS on the global scale. However, I feel a need to differentiate my informants because, as I will demonstrate, their concerns are often unique. In this thesis I use “Indian FOSS community” to discuss the relatively elite group of Indians who care about FOSS.

The size of the Indian FOSS community is not easy to calculate as it is dispersed and somewhat in flux, however from mailing lists, participation in user groups, and other forums there appear to be a few hundred very active members organizing the community and several thousand others who participate to a lesser degree, for example by attending conferences and participating in online forums. Although many people who create and advocate for FOSS throughout India know and work with each other on projects (technical, political, and social), there are also significant rifts along the lines of politics, professional affiliation, region, and generation. These fissures will be explored throughout the thesis but I found that despite these internal differences and occasional disconnects the term community adequately describes the general interests and goals of Indian FOSS enthusiasts, advocates, and activists. I often asked informants what they thought it meant to be a part of the Indian FOSS community and although the answers were not identical, no one questioned the question itself. In other words, though some members of the community may not be strongly connected to each other and while others may disagree on how, exactly, FOSS should be mobilised in India, there is a broad sense that there is a group of people who coalesce around this technology and, in general, see it as a tool that can benefit India and/or Indians.

Engineers v “geeks” & “hackers”

I would like to explain my use of the term software engineer. I am using the term software engineer to describe those professionals whose socio-economic function is to design and work with software. Unlike many other common terms that could be used to describe people who create and work with software, for example programmer, developer, hacker, geek, or coder, the term engineer not only historically locates software workers as professionals within the wider socio-economic world, it is also broad enough to be recognized as apt by the people who would identify with one or more of above list of terms, even if they would not accept every other term. While terms such as high-tech or IT workers can arguably locate subjects socio-economically just as well the fact that the majority of the people in the Indian FOSS community studied at
engineering colleges and universities solidifies the ties of this technical work to a history of
engineering as technology work which necessarily changes along with technology. Even so, my
decision to use this term also reflects a criticism of much social science research on FOSS (and
technology generally).

The ethnographers of American FOSS to date have chosen to use the terms “geeks” and “hackers”
to refer to their interlocutors. These terms are relatively popular amongst the FOSS community,
at least in the United States. I believe these terms have been used because the ethnographers of
American FOSS are representative of an emic focussed anthropology that privileges informants'
self-conception. Of course acknowledging self-conception is good practice and employing self-
conception in analysis of a community is valid. However, I find this particular nomenclature
obscures more than it elucidates.

Kelty (2008) and Coleman (2012; 2016) use the terms “geeks” and “hackers” respectively to
describe and valorise very clever people and both their ethnographies are full of examples of
how very clever their informants are. Kelty's geeks who mainly live in the US and Europe are
defined not by demographics but by their shared passion for FOSS when they come together to
form a recursive public. Kelty argues geeks are not capitalists or technocrats, even if they make a
living as either, because what makes a geek is a mode of thinking and working which any geek
will recognize as geeky and that geekiness is outside of and/or above political or social
categorization (2008: 35). Similarly, Coleman's hackers, who mainly reside in the US, are
defined by their shared passion for free software and their shared delight in humour that relies on
deep technical knowledge (2016). Kelty and Coleman are not wrong to acknowledge that the
people who create FOSS are passionate and clever, but to privilege passion and cleverness strips
their informants from their place within a wider socio-economic context that is, I think, crucial
for understanding how their informants understand their places in the world. In short, the use of
the terms “geek” and “hacker,” especially when not contextualized within a demographic
description, gives the impression that the group being described is a self-contained amorphous
unit, when that is far from the case. I arguing that these names not only obscure positioning and
thus including demographic context is integral to ethnography. To be clear, I am not suggesting it
is or should be the job of ethnography to claim to be representative of a particular society or
culture but that it is imperative that subjects of ethnography should be contextualised within their
wider sociocultural context so their significance can be better appreciated. In the case of the FOSS community, valorising self-conception as identity while also withholding demographic locators only serves to obscure the elite socio-economic positioning of community members, which uncritically upholds the ideal of individual merit as legitimate.

An additional critique of the appropriateness of using the terms “geeks” or “hackers” to describe the FOSS community is that it does not work well in India and likely other places as well. While Kelty’s definition of geeks and their apolitical positioning of speaking to power from outside of explicit power may be applicable when discussing Western FOSS enthusiasts, it does not work as well for the Indian FOSS community. In India there is a continuum from FOSS enthusiast to activist with many at some point in-between. While FOSS activists are certainly enthusiastic about FOSS’s technical merits, the ways in which they contribute to FOSS is to advocate for its use in ways that can contribute back to society at large. This desire to utilise FOSS for social good is acknowledged as explicitly political and even, at times, is reflected in close ties to political parties. Further, it is important to note that not all Indian FOSS enthusiasts fit into the aesthetics of geek humour assumed by Kelty and Coleman as defining characteristics of the FOSS community. This is not say that the Indian FOSS enthusiasts I know do not find some of the same things funny, they often do, but their sense of community is not based on this sense of humour to the same degree.

Finally, I want to be clear that members of the Indian FOSS community do not share any one identity. When I asked informants how they self-identify I was given many terms including: activist, hactivist, coder, engineer, evangelist, journalist, student, professor, government bureaucrat, and entrepreneur. I must also note that there are members of the Indian FOSS community who are not involved in technology work at all. My use of the term software engineer to discuss the people who create FOSS, then, is not intended to define all members of the Indian FOSS community; it is a way of locating the people who do create FOSS within a specific socioeconomic history that they would all recognise.

**Fieldwork**

Having previously researched the political economic positioning of Seattle area engineers and how this shaped their views on globalisation processes for my Master’s thesis (Folz 2009) I was eager to extend this research from another perspective for my PhD project. India seemed an ideal
location to further explore the relationships between technology workers and political economy. India is not only the epicentre of global outsourcing, but as a postcolonial developing nation India’s participation in globalisation has a complicated and in some ways conflicted positionality, which could be productively interrogated through the lens of FOSS. Although the organisation I originally wanted to work with, the National Resource Centre for Free and Open Source Software (NRC-FOSS) was no longer operating as such, the director of the research centre which had housed the NRC-FOSS, was happy to sponsor my research as he felt any additional insights into FOSS in India could be useful to those who had been championing FOSS in India for some time. After several months of sending forms to and fro my research visa was granted in February of 2016 and I arrived in Chennai on 26 February.

Chennai, formally known as Madras, is the capital city of the state Tamil Nadu and is situated in southern India on the Bay of Bengal. Chennai has a population of over seven million, making it the fourth largest city in India. While the region has been inhabited for many thousand years, the area was settled by the English as an outpost of the East India Company in the 17th century and over the following centuries the many villages of the area were consolidated into the city’s present formation. Indeed, Chennai’s social and economic history is strongly influenced by its inception as a colonial port city used to transport goods and natural resources. Following the industrial revolution in Europe, Chennai has long been an industrial hub and has specialized in manufacturing, especially automobiles, gaining the moniker “the Detroit of Asia.” Chennai is still an industrial hub for automotive and hardware manufacturing but has more recently embraced Indian’s IT boom and its firms represent technical sophistication and productivity rivalling other Indian IT hubs, including Bangalore (Saraswati 2012: xxv). No doubt this proclivity towards technology is aided by Chennai’s many technical colleges and universities, some of which are over a century old.

In preparation for fieldwork I started learning to code in the Python language and although it was not an intuitive technology for me I planned to continue throughout fieldwork and perhaps do some work for my host organisation. However, when I arrived the director said he felt understanding the language was not at all essential and suggested that instead I switch to FOSS based software for daily use and focus on the meanings of FOSS (though he did later assign me the task of using FOSS to build a website for my project, which I maintained throughout
This prioritisation of focusing on the meanings of FOSS in India rather than its technical attributes given to me by my key informant on my first day in the office proved to be significant. My research differs from other studies of the FOSS community in that although this thesis is about a kind of technology, the technology itself is not discussed much in technical terms. This is because, aside from the ensuring I understood the inherent freedom and openness of FOSS, my informants were far more interested in discussing the social, political, and economic aspects of FOSS.

Before I departed for the field it was assumed that I would not need language training as most professional IT work in India is conducted in English. In private sector IT companies English language use is common for a few reasons. First, many Indian IT companies do a lot of business with clients from English speaking nations, especially the United States. Secondly, the majority of Indian IT affiliated education is conducted in English so the language is associated with professional work. Finally, many Indian IT firms employ people from all over India and although Hindi may be dominant in the north of India it is seldom heard in the south where several IT hubs exist, most notably in Bangalore and Chennai, therefore it makes sense to conduct professional business in English, which does not have a regional bias. However, since the organisation I was affiliated with was not an internationally or even nationally active IT firm but rather a research institute housed within a university with local clients, such as the Tamil Nadu government, it is not at all surprising that day-to-day work was carried out in Tamil. To be clear, everyone at the research centre can speak English but it was seldom used for most conversations about work and certainly not for more personal discussions amongst friends. Since the office work is mostly conducted in Tamil it was not realistic that I would be able to meaningfully participate in the day-to-day office life. I did take Tamil lessons whilst in Chennai but it was too little too late to be of much practical use.

Due to language barriers (both in programming and Tamil), my original goal of producing a work-based ethnography of an Indian FOSS project at the research centre was no longer realistic. To be sure I spent a lot of time in the FOSS lab working on general research for my project and engaged in conversations but the office culture was not English oriented and I found it difficult to integrate. As such, much of my time at the AU-KBC consisted of sitting at my computer completing mundane tasks such as making travel arrangements or reading up on the people and
projects in the Indian FOSS community and occasionally attending meetings or events. Whilst I was pursuing my own work I did my best to observe and understand the daily work of the people in the FOSS lab but there was little participation on my part.

However discouraging they were at the time, the methodological difficulties I encountered at the AU-KBC opened up what I think was ultimately a more productive approach in that I shifted the focus of my research away from a local node of Indian FOSS and towards the Indian FOSS community more broadly. This shift entailed embarking on multi-sited research and in addition to cultivating relationships with various FOSS advocates and groups in Chennai I travelled to Mumbai and New Delhi and also made two trips each to Bangalore and Trivandrum. Through formal introductions by some of the key FOSS people in Chennai I was able to meet with many of the people who worked in industry, NGOs, academia, and the central and state governments to make FOSS a national issue. Through social media I was able to locate and connect with the younger generation of FOSS activists working at start-ups or with more leftist inclined organisations. Before each trip away from Chennai I arranged to meet with as many people as I could. This sometimes resulted in twelve hour days uber-ing all over a city to conduct interviews and attend events, especially when I visited Mumbai and New Delhi both of which I was only able to visit for one week. Because I visited Bangalore and Trivandrum twice, my days in those cities were more relaxed. No matter where I went members of the FOSS community took me under their wing. For example, I was often taken out for meals and invited to tour offices and campuses. Traveling to so many FOSS outposts in India deepened my understanding of how this technology is mobilised by a variety of situated actors in a way that would not be possible if I had spent the majority of my time in one place. Of course, conversely, the depth of my engagement with many people was limited by the logistical constraints of relatively short visits but, over the year, I was able to cultivate deeper relationships with a few key informants to make up for this.

All together I conducted interviews with about 60 people. Although I did conduct seven group interviews with co-workers or friends, most interviews were one on one. A few interviews were less than thirty minutes in length and a few exceeded two hours, most lasted about one hour.

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4 Readers familiar with India will note that I employ place names inconsistently in that I use some new names such as Chennai (formally Madras) and Mumbai (formally Bombay) but use the older names for Bangalore (now Bengaluru) and Trivandrum (now Thiruvananthapuram). I am following my informants’ lead in that most people I knew only used the newer names for Chennai and Mumbai.
While several interviews, particularly with more senior professionals, were conducted in offices, I also ended up interviewing people over meals or coffee at cafes or in their homes as well as in public spaces like parks or in hallways during conferences. The interviews were semi-structured and while I let interviewees steer the conversation I always asked about family background, education, and involvement in the FOSS community. All interviews were audio recorded and then transcribed before being coded for analysis.

In addition to interviews I also participated in several FOSS oriented activities. I attended monthly meetings of the Indian Linux User Group of Chennai as well as one meeting of the Delhi Linux User Group. I gave talks at two of these user group meetings as well as a guest lecture for an introduction to FOSS programming course at Anna University in Chennai. I was invited to attend a FOSS “boot camp” in which activists trained university students on the technical and moral merits of FOSS. I attended two Software Freedom Day celebrations put on by students at universities, one as a speaker. I also attended several meetings related to FOSS. For example, I went to a meet-up in Bangalore about the legal issues of using FOSS for start-ups. I attended a conference on the Python language at IIT Bombay and two national conferences on FOSS – one in Bangalore and another in Chennai.

Though much of my data are interview based I also spent as much time as possible socialising with members of the FOSS community. I went to house parties in Chennai, shared meals in peoples’ homes, and went out for meals with my informants at restaurants, especially when travelling outside of Chennai. My prior experience working as an on-site vendor manager at Microsoft as well as my American identity provided easy subjects for conversation. I understood the IT industry better than most non-engineers and because many of my informants had lived in or had a relative in the United States I could talk with them about where they or their relatives lived as well as engage in discussions about the 2016 presidential election, which many of my informants were following. Although everyone I met and worked with was friendly and considerate to a fault, with a few exceptions, I did not develop especially strong connections with many of my informants. The Indian FOSS community is populated mainly by men and this limited my ability to socially integrate. Inter-gender friendships are not especially common amongst the men I worked with. Though I did meet several women, no close friendships resulted. Despite these social barriers I was able to spend enough quality time with people in non-formal
settings that I experienced a genuine, if not deep, sense of rapport. And of course it was in these all too rare moments of informality in which the conversations ranged from popular culture to politics to marriage that I was able to make some of the most significant observations about the motives for and meanings of FOSS in India.

**Ethical Considerations**
Before fieldwork I received ethics approval from the University of Manchester’s Institutional Review Board which included assurances from me that I would not conduct interviews without informed consent. But, beyond that, I endeavoured to ensure my research was not only ethical from an institutional perspective but also from an interpersonal one. To protect the anonymity of my informants I have employed pseudonyms, even for those who were never formally interviewed. There are one or two individuals who specifically asked me to use their real names and I have. Of course the Indian FOSS community is relatively small and those within the community will likely be able to recognize each other. For this reason I have tried to anonymize any potentially controversial information. I was also asked not to discuss a few details that were relayed to me during the course of interviews or acquaintance and I have respected that. I am providing copies of the finished thesis to key informants and the thesis will be made publicly available via open access.

**Thesis Outline**
This first chapter of the thesis has introduced the reader to software generally and FOSS specifically, reviewed the anthropology of FOSS specifically and freedom in the Indian context more generally. I have clarified who software engineers are and also outlined how I am interpreting and using key terminology in the thesis. Finally, I discuss the logistics of and other considerations for the fieldwork on which this study is based.

Divided into two sections, Chapter Two provides an historical context for FOSS in India today. The first section traces the impact of colonialism on science and technology development in India and the relationships between technology and socio-economic development post-Independence and post liberalization. In the second section I tell the story of FOSS in India using informants’ personal histories to trace how the Indian FOSS community has grown and changed since the 1990s, paying especial attention to how policy and political affiliations shaped the community.
Chapter Three explores how, through “software evangelism,” FOSS is mobilised as an ethical project that both contributes to and critiques the nation generally and education specifically. I also analyse how the conversion to FOSS can be understood as what MacIntyre (1981) calls a “practice” and show how both socially and technically engaged evangelists use various strategies of persuasion to grow the community. I also explore how practitioners struggle with and critique each other over quality (purity) of practice.

Chapter Four details the ways in which FOSS is used by its middle class adherents as a “social tool.” After describing a FOSS project that has little to do with FOSS technologies I trace the history and growth of the Indian middle classes and discuss how my informants participate in activities that challenge some class and caste divides. This chapter also explores if FOSS in India should be considered a middle class social movement.

Chapter Five addresses the limits of freedom and openness in the Indian FOSS community by exploring how the community is experienced by men and women. I particularly look at how ideals of respectable femininity and hegemonic masculinity shape how women’s work is utilised and how this is similar and different to gender based discrimination in the global FOSS community.

Chapter Six interrogates the political economy of FOSS in India by examining FOSS in the contexts of information and communication technologies for development (ICTD), as well as how the government’s policies and practices are carried out in the public sector and how FOSS is utilised in the private sector. I also discuss the roles NGOs play in promoting and discouraging FOSS use.

Chapter Seven analyses FOSS as a postcolonial issue. I show how this research connects to related research on patents in seeds and pharmaceuticals. I also explore FOSS’s potential with regard to struggles for national autonomy in a postcolonial context as well as how members of the FOSS community view citizens’ struggles for civil liberties vis-a-vis the Indian government. In closing I discuss the contributions of this research to theories of the relationships between technology and society.
Chapter Two – Contextualising FOSS in India: Nation-Making through Technology

Introduction
The anthropology of FOSS to date has shown that this technology is representative of specific legal, philosophical, and implicitly political ideas and arguments, mainly rooted in the West. However, the significance of FOSS in and for developing nations encompasses these issues but also goes beyond them making FOSS an explicitly political technology. To appreciate the ways in which FOSS in India represents different concerns than it does in developed nations we must first contextualise FOSS as a technology within India’s social and economic history. Unlike the roles technology has played in rise and spread of industrialization in Western economies, India’s industrialization process and its attendant social, cultural, and political economic ramifications must be understood as both an instrument of and resistance to the colonial project. Likewise, the history of FOSS in India reflects and extends the nation’s complicated relationships with technologies that originated in the West. The complicated relationships between the Indian elites who create and consume FOSS must also be understood if we are to appreciate what makes FOSS in India unique.

Divided into two main sections this chapter will address the historical and contemporary roles of technology generally and FOSS specifically in India. In the first section this is accomplished by tracing the complicated relationships between colonialism and technology and the changing nature of post-Independence political economy. In the second section the story of FOSS in India is told by those who have worked to create and spread this technology since the 1990s.

Historical Context

Technology and the colonial/postcolonial project
Tracing the inter-twined histories of colonialism, science and technology and the nationalist movement in India, Prakash (1999) shows the ways in which science and technology were used by both the colonizing British and the colonized Indians to define and negotiate what were ultimately teleologically different projects. The British used science as part of their “civilising” rationale; on the one hand it represented a universal knowledge but on the other hand this universality was necessarily presented through the reflection of the very particular colonial context and thus “Science’s functioning as a technology of colonial governance and as an
ideology of improvement overshadowed its representation as a body of universal laws of nature” (1999:20). Many Western educated Indian elites negotiated the terms of their knowledge under colonial power by claiming science as an innately Indian way of knowing, a popular example being the promotion of ancient Ayurvedic medicine as intrinsically scientific. This claim was based on ancient Hindu texts, the Vedas, which covered all manner of religious and natural philosophy. That some Indian scientists were so keen to demonstrate their culture’s independent science can be read not only as their ability to contribute to a “universal” knowledge but also as the renegotiation of their identity and positionality vis-à-vis British rule (Prakash 1999:118-120).

The critiques of science and technology amongst Indians, however, were not uniform. Visvanathan documents no less than eight schools of alternative science in pre-Independence India, including: Swadeshi Nationalists who advocated for local knowledge, Theosophists felt Western science was inherently violent and argued for homeopathy, Leninist Technocrats who felt the Western scientific method was the best way to move India forward, and, Neo-vitalists, including Rabindranath Tagore, who were interested in how Western “city” sciences and Indian “forest” sciences would mesh or clash (2006: 168-169). Gandhi’s advocacy for “appropriate technology,” meaning technology that enhances rather than disrupts local socioeconomic life on a case by case basis, was exemplified by his use of the Charkha or spinning wheel which simultaneously upheld a traditional Indian way of life and served as a rebuke to imported British cloth made from Indian cotton. As Ninan makes clear, Gandhian science and technology was explicitly embedded in traditional understandings of the nature-human relationship (2009: 184).

While some of these schools of thought had more in common than not, others were at cross-purposes. However, the true significance is the fact that there was such an active alternative science community, showing that even among the elites who fought for Independence there was no one agreed upon route that Indian science and technology should take. Be that as it may, Prakash (1999) argues the mere act of asserting native sources and forms of knowledge by the emerging Indian elite is counter-hegemonic and this was certainly how the nationalist movement incorporated science and technology into arguments for independence.

The British government used infrastructural technologies such as telegraphs, irrigation works and especially the railway not only to modernise and connect India but to more easily extract its resources and control its territory and people. Significantly, although many Indians were employed by these massive technological projects they were seldom employed as engineers and
were considered unqualified to positions of power until Independence was nigh (e.g. Bear 2007; Ramnath 2017). Prakash argues “The nationalist campaign for state power to exert control over the space constituted by technics, therefore, involved a profound ideological struggle to negotiate the breach between the cultural imagination of the nation as an archaic community and its existence as a space of modernity” (1999: 160-161). The very modernising project of the colonial government, like one of its components, science, can be understood as a “civilising” project that, like science, was seized upon by some in the nationalist movement – including Gandhi, Nehru, and Tagore – as something that must be done in an inherently Indian way. Indian scholars were able to demonstrate that the British had used technology to extract Indian resources to fund the English industrial revolution, while they had simultaneously de-industrialized India to protect English industry (Prakash 1999: 189-190). Thus, while nationalists critiqued how technology was wielded under colonial rule, they advocated for the use of science and technology to propel India into modernity on its own terms such that “Planned development and technology experts were to accomplish what the colonial government was unable to undertake because it was captive to narrow British political and commercial interests” (Prakash 1999: 199). Indeed, India’s Nehru thought India could improve on Western science by wedding it to an Indian humanism that was based in a spirit of renunciation and thus was “naturally” more moral, placing the common good over profit (Prakash 1999: 210-211). As Prakash makes clear, however, there is nothing more or less natural about Indian or Western science, both spring from particular historical trajectories and neither science was ever free of its socio-cultural or religious context; without doubt Enlightenment scientists were as concerned with religious goals as scientific (e.g. Iliffe 2017; Noble 2013). It is with an eye to India’s colonial past that we will now turn to India’s current political economy so as to better situate FOSS as a site of anthropological enquiry in the contemporary Indian context.

Post-Independence Political Economy: From Non-alignment to Liberalisation
Beginning with Independence and Nehru’s enthusiasm for science and technology in its own right as well as a strategy to advance Indian economic and social development, India’s technology policies must first be viewed through the country’s political and economic history. India’s political and economic history from Independence in 1947 up through its present integration within the global economy deserves some attention because this history elucidates some of the apparent contradictions in the nation’s current uneven development. India’s
economic strategies post-independence were rooted in a desire for national autonomy and included a “semi-planned” economy inspired by the USSR that emphasized rapid industrialization and included “five year plans” but which sought a middle or third way (Cameron and Ndlovu 2001: 61-62; Pantham 2004: 441).

During the 1950s this third way was also reflected in the nation’s more or less successful circumvention of the cold war alliances in which nations had to side with the USA or USSR by declaring India to be politically non-aligned. This approach to foreign policy was rooted in Nehru’s twinned desires to assert national autonomy post-Independence as well as to create a coalition of nations, mostly from Asia and Africa, that could pressure the powerful nations aligned with the USA or USSR towards the needs and goals of the non-aligned, often newly independent nations (Nanda 1998: 248-249). In addition to helming successful diplomacy in several international skirmishes throughout the 1950s, India’s non-alignment strategy was in part successful because of the perception of India as a morally superior nation which, in turn, was rooted to a large degree in Nehru’s reputation for integrity as a leader, along with Gandhi, of a peaceful independence movement (Guha 2007: 179). Although intrinsic to giving the country power on the world stage, India’s commitment to political non-alignment was often questioned. During the 1960s India accepted arms aid from the United States to help in its war with China but also maintained ties with the USSR. Although neither the US or the USSR were happy with India accepting American aid while maintaining a neutral position, both the US and the USSR were more concerned with China and thus India was able to maintain its non-aligned position and even improve its relationships with the competing super powers (Nanda 1998: 246-247).

After wars with both China and Pakistan, the death of Nehru, and Indira Gandhi’s undemocratic Emergency in the 1970s, the nation’s strategically morally superior stance was harder to maintain, though up through the 1980s non-alignment was India’s foreign policy (Guha 2007: 527). However, as globalisation processes drew India ever deeper into the web of global capital, political non-alignment was no longer as powerful as it had been. This is because, increasingly, multinational corporations and transnational organisations such as the World Bank and International Monetary Fund (IMF) often exercised more power over developing nations than other sovereign states.

At the same time liberalisation was starting, the political landscape was undergoing massive changes. Since Independence national politics had been dominated by one party, and one family.
Except for a brief interlude in the late 1970s when the Janata Party was in power the Congress Party as led by the Nehru-Gandhis represented Indian politics. However, at the state and regional level politics had always been more heterogeneous and by the late 1980s several regional leaders and the growing movement of Hindu nationalism all bubbled up to the national level. Throughout the 1990s the Congress Party lost seats and the right-wing Hindu Nationalist Bharatiya Janata Party (BJP) gained them. These shifts in political power have continued, as have changes in economic policy.

From Independence, Indian economic policy favoured state directed industrialisation and was wary of foreign corporations; although in the 1980s some regulations were loosened to help grow industry, Guha makes clear that these policy changes were “pro-business” rather than “pro-market” (2007: 692-694). While basically self-sufficient in terms of internal production and consumption, by the early 1990s, as a result of the breakup of the USSR (India’s largest trading partner and source for many goods not produced in-country), government debt, and the spike in oil prices brought on by the first Gulf War, India had a balance of payment crisis and asked the IMF for a 1.8 billion dollar bailout, which was premised on the country liberalizing its economic policies (Guha 2007: 694; Pantham 2004: 444). This economic liberalisation resulted in the lifting of protectionist tariffs and, notably, disbanding what was known as the “Licence Raj,” a notorious bureaucratic system that required many agencies to approve of a firm’s product, production strategies, and labour policies. While deregulation freed businesses from some aspects of government bureaucracy and opened up the nation’s borders through free trade, economic liberalisation has not been uncritically welcomed.

Using the Indian auto and consumer durable goods industries as examples D’Costa (2005) demonstrates how India’s government policies, growing middle class, and industrial firms have, since 1947, almost fully integrated India into the global market, though, he argues, at a great cost to the majority of the nation’s population. Global integration has also resulted in many foreign firms entering India. Indeed, between 1991 and 2000 more than 10,000 foreign investment proposals were approved by the Indian government (Guha 2007: 699). Some of these foreign incursions have been welcomed by the growing middle class who often work (even if indirectly) for multinational corporations and desire aspirational consumer products. However, there are many who also question the social, economic, and environmental costs associated with liberalisation (see, for example, Cross’s (2014) analysis of how special economic zones have
been implemented throughout India).

**Historical Overview of Indian IT Policy and Practice**

Tracing how India’s government, industry, academic, and civil society have shaped science and technology policies from pre-Independence through the year 2000, Krishna uses Elzinaga and Jamison’s definition of science and technology policy cultures which include political-bureaucratic, industry-market, academic, and civic components which “...stand out as representatives of the dominant voices... represent different political and social interests and draw on different institutional bases and traditions for their positions” (Elzinga and Jamison quoted in Krishna 2001: 180). Below is a table outlining the basic tenets of each policy culture (Krishna 2001: 180):

<table>
<thead>
<tr>
<th></th>
<th>Political–bureaucratic</th>
<th>Industry–market</th>
<th>Academic</th>
<th>Civic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development Priorities</td>
<td>Defined by political priorities in collaboration with technocracy</td>
<td>Defined by industrial and market demands and stakeholders</td>
<td>Importance of basic research, Universities and academic excellence</td>
<td>Priorities set by democratic institutions, actors and processes</td>
</tr>
<tr>
<td>Policy instruments</td>
<td>State policies, plans &amp; S&amp;T statements</td>
<td>Market, private industry mechanisms and regulations</td>
<td>Peer evaluation and regulation</td>
<td>Public debates and participatory regulation</td>
</tr>
<tr>
<td>Ethos</td>
<td>Top-down/hierarchical Public good/profit</td>
<td>Entrepreneurial/competition/profit</td>
<td>Scientific/cosmopolitan values</td>
<td>Democratic/bottom up/public good</td>
</tr>
<tr>
<td>Core constituents</td>
<td>Planning Commission, S&amp;T ministries, defence and science councils</td>
<td>Private/public enterprises, CII, FICCI, chambers of commerce, market forces</td>
<td>Universities/science academies and councils/ science community</td>
<td>S&amp;T movements, NGOs, civil society and its representatives</td>
</tr>
</tbody>
</table>


Krishna contends that, post-Independence, there are three significant phases of Indian science and technology policy: 1947-1970, 1970-1990, and post 1991 (2001: 181). Further, each phase was influenced to a greater or lesser extent by the four policy cultures he had outlined (2001: 181):
Table 2.2 Influence of S&T policy cultures during different phases

<table>
<thead>
<tr>
<th>Year</th>
<th>Political–Bureaucratic</th>
<th>Industry–market</th>
<th>Academic</th>
<th>Civic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1947–1970</td>
<td>XXXX</td>
<td>X</td>
<td>XX (1950s)</td>
<td>X</td>
</tr>
<tr>
<td>1970s</td>
<td>XXX</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>1980s</td>
<td>XXX</td>
<td>X</td>
<td>X</td>
<td>XX</td>
</tr>
<tr>
<td>1990s</td>
<td>XX</td>
<td>XXXX</td>
<td>X</td>
<td>XX</td>
</tr>
</tbody>
</table>

Table 2.2 Influence of S&T policy cultures during different phases

Key: XXXX very high influence, XXX high influence, XX moderate influence, X low influence

Source Krishna (2001)

Krishna assesses influence based on the degree influential actors from different “science and technology policy cultures” outlined in in Table 2.1 are able to push their policies. As Table 2.2 makes clear, up until liberalisation in the early 1990s, India’s science and technology policy and development was driven by government. Nehru particularly is given credit for promoting technological development through policy. Nehru saw the development of Indian technology as consisting of three layers: a foundation of education and research institutions, core technologies used by the country, and policies directed by the government’s central planning (Subramanian 2006: 34). The concept of Swadeshi, or self-reliance, was a defining feature not only of the struggle for Independence, it also defined technological development in post-Independence India (Subramanian 2006: 32). Nehru’s “policy for science” created much of the country’s science and technology infrastructure, including government departments and universities devoted to advancing scientific prowess within India. However, despite Nehru’s support for science and technology, initiatives between 1947-1964 were mostly concerned with the issues that interested an alliance of elite scientists Nehru knew personally or, as Krishna explains, “…the ‘policy for science’ can largely be explained in terms of informal science policy determined by the alliance” (2001: 183).

Beginning in the 1970s, the government strengthened its stance of technological isolationism via bans on imports to protect Indian R&D and support self-sufficiency. India also began its first five year Science and Technology Plan (1974-79), tested its first nuclear device, got into the space race, increased agricultural output, and improved its pharmaceutical capabilities. Krishna notes all of these developments indicate the government moved from the predominately optimistic view of science and technology as the key to national development via industrialisation under
Nehru to a more critical evaluation, led by Gandhian influenced activists who questioned some development practices and advocated for appropriate technology (2001: 184). Under Indira Gandhi and later the Janata Party who came to power in 1977, this can be understood as a shift in policy from “policy for science” to “science for policy” (Krishna 2001: 184). The government lifted some barriers to technology imports in the 1980s that helped the private sector grow but it was still generally uninterested in what the private sector could offer. The 1980s also shows the emergence of the civic influence on policy as citizens organised in response to industrial accidents and “general disenchantment” with how science and technology met or, rather, failed to meet the nation’s needs (Krishna 2001: 185). It was not until the collapse of the USSR and liberalisation mandated by IMF loans in 1991 that the private sector had a significant role in policy development, as evidenced by the “New Industrial Policy” (NIP) of 1991 (Krishna 2001: 186).

While observing many of the same general trends as Krishna, Subramanian, a professor of computer science with an industry background, notes that, until the early 1980s, India’s computer sciences were stifled by technological isolation that came from both internal and external forces (2006: 29). In 1965 India and Pakistan went to war and the United States sided with Pakistan as a cold war ally and thus stopped exporting electronics to India, because of its allegiance with the USSR. In 1967 the Indian government created the Electronics Corporation of India Limited (ECIL) to produce computers and other electronics but also invited imports from multinational corporations to fill the gap until their home grown technologies were ready (Subramanian 2006: 35). However, the multinational corporations only sent outdated or obsolete technologies. These outside forces, in combination with the country’s commitment to Swadeshi, made it almost inevitable that the government resolved to become completely self-sufficient with regard to computer technology in 1968 (Subramanian 2006: 36). In 1971 the Electronics Commission became the primary IT policy maker and the Department of Electronics (DoE) was responsible for implementing said policies (Subramanian 2006: 36). Throughout the 1970s, it had been nearly impossible to import technology, even if the technology did not exist in India. This was partly due to the “prevailing socialist mindset” in the Electronics Commission and partly due to corruption in the DoE and its “permit raj” (Subramanian 2006: 36-7). In 1984, Seshagiri, the director of the Computer Directorate under the National Informatics Centre (NIC) rallied support from prominent politicians and got approval from Indira Gandhi for the “Computer Policy”
which liberalised the import and export of software which then provided incentives for software innovation in the private sector and the creation of the National Association of Software and Service Companies (NASSCOM) (Subramanian 2006: 39). Economist Jyoti Saraswati notes that in addition to surreptitiously allowing computer imports via capital imports from the late 1970s, the Indian computer market was unique in that it would import computer kits to be “made in India” but that these computers came without software bundled in, so that Indian computer companies would be contracted to create software and that this, in combination with the unrelated Software Export Scheme of the 1970s resulted in a growing software services capability amongst Indian computer companies (2012: 56-57). The Indian software sector grew throughout the 1980s and policies continued to favour the IT industry into 1991.

Throughout the 1990s as the software boom grew, so too did the power of the Indian software industry association NASSCOM. Saraswati shows that, in fact, it is largely NASSCOM that has guided government technology policy at the DoE, all in the name of promoting Indian business (2012: 71). Saraswati also demonstrates that aside from any reservations one may have of an industry guiding government policy, NASSCOM has been taken over by representatives of global IT multinationals and thus it has become “a Trojan horse for Western capital more generally” and does not have the interests of Indian IT at heart (2012: 94).

**The Rise of the Indian Software Engineer as a National and Global Phenomenon**

Software engineers have become a ubiquitous representation of contemporary India. When contextualized within the history of post-colonial government policies which favoured investments in large-scale technology infrastructure and post-liberalisation which brought India into globalisation processes, the rise of the Indian engineer makes sense. At Independence about 5,500 engineers were graduating per year, but this figure has steadily grown with industrialisation and then liberalisation so that by 2006 at least 220,000 engineers graduate each year (Fuller and Narasimhan 2014: 94). In this section I will outline how post-colonial investment in post-secondary technical education and neo-liberal labour regimes positioned Indian software engineers in the centre of the outsourcing phenomenon.

One of the most significant results of Nehruvian era technology policy was the founding of the Indian Institutes of Technology (IITs), conceived as elite universities to produce the technical experts needed to modernize a new nation. Although plans to establish world class technical
universities began in the late 1940s the first IIT, IIT Kharagpur, opened in West Bengal in 1951. In the following decade four more IIT campuses were opened across the country: IIT Bombay (1958), IIT Kanpur (1959), IIT Madras (1959), and IIT Delhi (1961). Reflecting India’s commitment to non-alignment and post-war international development initiatives, three of the first IITs were sponsored and co-managed by experts from the USSR, Germany, and the US respectively (Amrute 2016: 123). Beginning in 1994 more IITs have been created throughout the country so that by 2016 there were a total of 23. Financed and administered by the central government, IITs are outside of and above the university and college system at the state level and thus are autonomous with regard to administration, faculty and student recruitment, and curriculum development (Subramanian 2015: 291). Internationally ranked, the IITs have represented the best and brightest of Indian engineering within and outside of India from the 1950s. Indeed, IITians are well represented as leaders in the American and Indian IT sector. Of course, the majority of India’s engineers do not attend the IITs but the symbolic capital of the IITs helped secure the reputation of India as the producer of world-class technical talent.

While the technology industry had limited growth during the 1970s and 80s when economic liberalisation came the burgeoning IT industry was able to take full advantage of the pro-technology government infrastructure, including government subsidised engineering education, which had been sustained since Independence. Indeed, Upadhya reminds us that the international and Indian IT industry was only able to flourish post-liberalisation because of government policies put in place “…such as tax holidays, an almost regulation-free regime, and provisions for subsidised infrastructure” (2004: 5141). In the 1990s foreign venture capital was allowed into India and many Indian and international corporations set up shop in the numerous new software technology parks around the country. Outsourcing work, sometimes referred to as Business Process Outsourcing (BPO), conducted in India includes relatively low-level tasks such as data entry or call centre work as well as more complex work such as testing and writing code. In the outsourcing model even highly skilled labour was performed at a fraction of the cost of similar work in the West and, despite complications inherent to the model – differences in time zones and challenges of intercultural communication – the gains for international and Indian corporations were immense. In addition to the outsourcing model many other international and Indian corporations recruited Indian engineers to come work abroad on short-term contracts. Work conducted through (usually) Indian owned firms who recruit and manage Indian
employees in foreign countries is referred to as body shopping and generally entails highly skilled labour. Both outsourcing and body shopping helped redefine India on the world stage as a nation “on the rise” whose technical capabilities were respected but – importantly – were also a source of anxiety as a threat to job security of Western software engineers (Folz 2008; Doussard and Mastracci 2003; Trussen and Woods 2017).

The majority of Indian software engineers who instigated the IT boom came from middle class, upper caste backgrounds and their socio-economic positioning cannot be minimised. Most of the Indian software companies were founded not by India’s traditional business communities but by elite members of the middle class with engineering backgrounds, often educated at the IITs (Upadhya 2004: 5142). Significantly, with the rise of the IT industry and annual growth of GDP and the middle class, attitudes towards government directed development have shifted from patriotic to critical. Upadhya contends that members of the Indian IT industry should be understood as a new kind of capitalist class who see the economic growth associated with unregulated business as “a shortcut to social development” (2004: 5148). As the following section will show, however, not all members of the upper middle classes working in IT share this ideology.

**History of FOSS in India**

The Madras Institute of Technology is a tree filled respite from the heat and noise of Chromepet, a suburb in south Chennai. To enter the campus I walk through the throngs of people milling about the train station, some sitting on the pedestrian bridge selling fruit and vegetables to commuters, the rest walking quickly to or from the train tracks. As I descend from the station I note that someone has left crumbled biscuits for the dog that is always there in the mornings but never in the evenings. Narrow lanes surround the campus and are filled with small shops that sell any and every thing one might need – from saris, to household goods and auto parts. There are also street food vendors and, a few lanes away, a small temple. Interspersed amongst and radiating out from the hustle and bustle of the shops are houses and, more and more, apartment buildings. It is not uncommon to step aside to let a wandering cow gain the right of way. I enter through a guarded gate and produce an ID card; the guards all know who I am, the only white lady who comes to the campus every day, but the few times I tried to enter without showing it I was instructed to produce my ID.
Once on campus I walk down tree lined lanes and note the women in saris sweeping leaves and rubbish into piles along the roadside. There are students walking down the middle of the road between classes; the men wear collared shirts with jeans or slacks and the young women are dressed in long kurtas over churidar leggings with matching dupattas draped over their shoulders. As I take a right onto the main campus road I am surrounded by square, modernist department buildings, all of different colours, but all faded. I take a left and pass the old Indian Navy planes that sit in front of the Aerospace Department and I keep going until I come to the two story building which houses the Anna University KBC Research Centre. As I enter the lobby I am hit by a blast of air conditioning and realise how hot I’ve gotten in the five minute walk from the train station. First, I go to the stack of attendance rosters by reception and enter my initials in the appropriate book; everyone must sign in. Then I walk up to the first floor and turn right to get to the FOSS lab.

There is an old paper sign on the door, curling at the edges, that reads: FOSS LAB. Once you open the door the room is long with tables on each side. There are six tall lockers on the right as you enter where people store personal belongings. The lab is divided into two rooms by a wall with a door. This wall is about nine feet high and has glass windows for the top two thirds and it does not reach the room's ceiling, which is about fifteen feet high. The door to this dividing wall is always left open, essentially making the two rooms one. There are computers lined up on the tables on both sides of the room and are designated work stations for the FOSS lab employees. There is a window in the top third of the outside facing wall that lets in light but there are also several long florescent lights as well as a row of fans along the entirety of the ceiling. Though there is obviously air conditioning it is not as strong as in other offices in the building, perhaps because this room is larger. There are windows into the adjoining rooms which house the NLP (natural language processing) lab along the left side of the FOSS lab. Like the rest of the AU-KBC it’s all somewhat dusty and there are piles of papers and equipment here and there. There are many PC towers and monitors stored under the workstations in addition to those lined up along the top. The workstations themselves consist of tables which run the length of the room and are about three feet deep. They are painted light grey and you can see the wood wearing through the paint along the rounded edges. There are several holes drilled along the back of the tables to route all the computer cables through. The floor is beige tile like the rest of the building. Between eight and ten people regularly work in the lab, spread out somewhat evenly along the
length of the room. In the front room as you enter there are usually about three or four students sitting with laptops working on their term projects. As you enter the back half of the lab there are two women, Arivindha and Deepa, who always sit on the left side of the room, facing into the NLP lab. Behind them to the right there are tables with workstations where three to four men sit and, behind them, the room juts out further to the right and houses more workstations and storage cabinets. Everyone, apart from the students, is an employee of the AU-KBC Research Centre working on a variety of projects at any given time for government or corporate clients. People work quietly at their stations most of the day, though of course there are occasional conversations or even a cricket match showing on one of the computers where the men sit. Everyone speaks in Tamil with English words sprinkled throughout.

People start coming into the lab between 9am and 10am each morning Monday through Saturday. Lunch is usually taken downstairs in the canteen where everyone takes out their food and chats whilst eating. There is also a tea break every afternoon; the directors are brought their chai in china cups with saucers while everyone else must serve themselves from the large canisters of tea, using small, paper cups. Most days Arivindha’s daughter, who is five, comes in after lunch and stays all afternoon running from one person to the next asking questions and playing before passing out splayed across two office chairs for her nap. Everyone dotes on her and although she was constantly interrupting people it does not bother anyone. Perhaps this is because interruptions are part of the everyday ebb and flow in the office; power cuts happen at least three to four times per week, disrupting whatever one was working on, similarly disruptive are regular requests to leave by the cleaning staff so they can sweep out the room. Around 5:30-6pm people start leaving for the day, unless they are working on a tight deadline and need to stay late.

This lab was created to carry out work for the National Resource Centre for Free and Open Source Software (NRC-FOSS), a government sponsored project that no longer exists. Indeed, the NRC-FOSS lost funding in 2012 and now some of the work carried out in the FOSS lab is not even FOSS based; they take on projects using proprietary software if the client requests it and many of the machines in the lab run Windows. Although I spent a lot of time in this lab and my research in India was sponsored by the AU-KBC, my thesis has little to do with the day-to-day life of the FOSS lab. However, how and why this lab was created and then re-purposed and the issues and concerns of those who created it and still work in it are integral to understanding the story of FOSS in India. To that end this section is concerned with the history of FOSS in India,
and is organised into four distinct time periods highlighted by my informants: the 1990s, the early 2000s, 2004-2014, and 2015-2017. By unpacking the personal histories of my informants, in combination with archival sources, I will trace FOSS in India from the hobby of a few software professionals through the burgeoning IT growth of the 1990s and examine the ways in which academic, political, and corporate concerns sought to harness FOSS and then follow these groups through the 2000s when many of these various concerns split along ideological lines but continue to converge here and there in pragmatic efforts to spread FOSS for the good of the nation, even as the significance of FOSS and the definition of national good is not necessarily agreed upon.

The First Decade: The 1990s
Those in their late 40s or older were able to trace their involvement with FOSS to the introduction of Linux in India in the early 1990s. Before then many people had been using the precursor to Linux, UNIX, so the migration was comfortable. Abhimanyu, a software engineer who began working in 1987 told me that in 1988 a bureaucrat sent a circular saying all standard computers for government purchase need to use UNIX. This one note changed Indian computing: “Basically mandated open software.” He said no one knows the exact reasoning behind the pro UNIX policy; however, this one memo precluded using IBM and Microsoft and standardized computing for a large swathe of Indian engineers. Linux was released in 1991 and the early adopters I spoke with appreciated its inherent malleability and thus saw its potential to conform to the needs not only of the software developer and the end user but also to a multilingual nation. Indeed, several informants shared stories of setting up Linux servers in their university labs and reconfiguring them as needed, a capability that was not as easy with propitiatory software. As with access to all software in the early 90s, only a small group of technical specialists and hobbyists had access to Linux via their affiliation with universities or government departments. As Linux acquired more enthusiasts, Linux User Groups (LUGs) were formed and computer magazines started featuring, and sharing, the software to increasingly wider audiences. However, before enthusiasm could grow and flourish, access to computers and internet needed to be established.

The internet came to India in 1986 and following economic liberalisation in 1991 the development, import and export of IT products and services increased exponentially. As IT was becoming more user friendly and relatively easier to access, demand for internet connections
rose. For example, PV, a retired bureaucrat who worked for the Department of Electronics in the 1990s, told me about his assignment to provide internet access to eight elite institutions. There was a high demand for internet access amongst bureaucrats and academics, many of whom had sons working abroad they wanted to connect with. As there was no specific rule saying he could not, he granted internet access to anyone who asked. This permissiveness soon led to bureaucratic tussles wherein he was told that giving internet access was the responsibility of the Department of Telecommunications. This did not stop him: “I cajoled, I went round… I had to satisfy the needs of my users and I had such a compelling pioneering spirit.” Indeed, he was part of the group which recommended internet service provision be opened up to the private sector, which happened in 1998. By the close of the 1990s most universities and government departments were online and PV told me the diffusion of internet within India was recorded by the United Nations Development Program as “very successful.” The work this bureaucrat and his colleagues did to spread the internet and IT access more generally enabled Linux to take root and then thrive in India throughout the 1990s.

At the same time as many in the central government were bending bureaucracy to favour IT spread and adoption, other levels of bureaucracy were making it difficult to legally acquire Microsoft products. Nandan, a professor in the computer science department at IIT Bombay told me that in the early 1990s they had difficulty getting legal copies of Windows. Acquiring Windows was not an issue of cost but of doing it properly through bureaucratic channels. At the same time, the first version of the Linux kernel was released and was relatively easy to procure as it did not entail expensing procedures. Beyond the logistical ease there were many reasons to adopt Linux. Nandan shared an example: instead of buying network equipment for bridging computers throughout the department they could take a 386 machine and use the Linux kernel and two network cards, allowing it access to all the machines they wanted to connect. As well, many of the students wanted to play with the Linux kernel and they would hold Linux programming competitions. Because it was so versatile and easy to use, as well as the fact that there was source code available from all over the world for free and the fact that they did not have to go through bureaucratic channels, the department adopted Linux as the best fit for many of their needs.

While the IITs were embracing Linux, access to computers and the internet was still very limited outside of the IIT system. One software engineer I met, Dev, told me that when he went to a
small university in 1995 there was very limited access to computers and no internet, even though he was studying computer science. Students would only have time to work on a computer during labs, and only in the third year of study. Dev had been able to access the internet at home because his father worked for a prestigious university that had one of the few internet access points in India at that time. With two friends he bought a computer so they could actually do some computer science work before the third year and then other students got computers and they networked them all together. Although FOSS was not a part of the curriculum the professors let Dev and his friends install Linux on a few lab computers and they were given autonomy to do class projects in Linux.

Although many people discovered Linux in university, some came to it through work. Sam, who is the head of IT at the government railway hospital in Chennai, explained that when the hospital first got computers in 1988 they ran on UNIX. In 1996/7 when they were looking to upgrade their IT systems there was not a lot of support for UNIX so they were looking to migrate to Windows. However by that time there were Linux distributions available and for Sam it was a more comfortable transition from UNIX so, for him, there was a strong technical argument for Linux. He further added, “The other important factor is in government getting funds is a laborious process... Linux is available free, why don't we take it? That was the initial prompt but once we actually crossed that area and got inside there were a lot more advantage than that. For example, the products are much more stable than most of the proprietary [products].” Sam explained that with the UNIX platform they ran the computerized system from 8am to 6pm but when they migrated to Linux they could run the system 24/7. In addition to being free of cost and technically superior, Sam said that if he had a question he could write to a Linux mailing list and get an answer within fifteen to twenty minutes. Emailing the list became possible when the hospital got dial up internet in 1999.

In addition to learning about Linux through school and work, several people I met could trace their introduction to FOSS via Linux to a magazine called PCQuest, influential evangelists, and the popularity of Red Hat India. PCQuest magazine, which was very popular with Indian computer hobbyists in the 1990s, would give away CDs with the Linux operating system and, through experimenting with that CD, many were converted. Another common introduction to Linux came from a well-known computer scientist, Atul Chitnis, who was associated with
PCQuest magazine and was an early evangelist of FOSS in 1990s. He not only wrote about Linux but organised an annual event called FOSS.IN, which was the first major FOSS conference in India. Although many people noted he was difficult to work with, everyone respected his dedication to forwarding FOSS in India. Red Hat, an American company that created its own version of Linux, was cited by several informants as their introduction to FOSS. Although Red Hat’s version of Linux was free, they charged for customization and customer service. The Red Hat version of Linux became very popular in India throughout the 1990s and the company opened an Indian office in 2000.

Perhaps the most significant outcome of the growth of Linux in India throughout the 1990s was the rise of Linux User Groups (LUGs). Usually affiliated with universities, LUGs had sprung up in all of India’s major cities by the late 1990s. Held on a monthly basis, the purpose of these groups was to meet up with other Linux enthusiasts to share knowledge. The format of the meetings includes two to three talks about programming or an application followed by opening up the meeting to general discussion. The meeting is often followed by an informal meal. Rav, a computer sciences professor, told me the story of how he started the LUG at IIT Madras. He was a computer science student and interested in Linux. If he had any questions he would submit them to the Linux India mailing list (started in 1997). Rav became very active on the mailing list, at one point being one of the top contributors to the Q&A forum. In 1998 he met another Linux enthusiast in Chennai and they decided to meet and discuss Linux issues; they held the first meetings in a house and then as more people became interested they arranged to get a room at IIT Madras and the Chennai LUG has been held in room 1 of the Aerospace Engineering Department ever since. The role of LUGs will be discussed in more detail in Chapter Three but, suffice it to say, they have been instrumental in the social reproduction of FOSS in India.

Turn of the Century: 1999 – 2003
As the turn of the century approached, India’s IT sector was booming in large part due to outsourcing work needed to combat the panic over the Y2K bug. In the burgeoning FOSS community people were excited about the possibilities that the IT boom held for free software in India. Particularly those in government and academe were pushing to make FOSS official policy for technical and moral reasons. LUGs were present in most cities, regional and national conferences were organised, and Richard Stallman himself made the first of many trips to India. On the corporate side of things Red Hat remained a significant corporate player and some of
India’s larger IT firms started doing some work with FOSS. One of India’s most successful and best known FOSS initiatives was implemented in the state of Kerala. In sum, the beginning of the twenty-first century saw a blossoming of FOSS in India. Below I will detail the growth of the Indian FOSS community by discussing how software engineers forged their careers based on FOSS, the FOSS.IN conference, Kerala’s IT@schools project, and the central government’s FOSS policy.

Several men who started their careers during the early 2000s felt so passionately about FOSS that they embarked on careers centred around it, despite the associated risks of working with a relatively niche software. At that time it was considered poor judgement to eschew the stability of working for an established company, either Indian or American, to start up your own. In fact, many people told me their parents would not allow them to do something that was seen as inherently unstable. Dev, however, comes from a family in which his father “would generally encourage us to do whatever we wanted. So my brother is an artist. He didn’t encourage us to be conventional in any sense” and Dev started his company right out of university. He explained that while at university he had been helping a friend who had a small business and so he had some experience and that in 2000 everyone had hopes that if they began a start-up they would get funded by venture capitalists and be successful. He explained: “I had that hope as well, that I could make a difference to how free software was used and developed in India... and all the jobs that were available were about programming on Windows. ...I was sure that I wanted to build products which were going to be free software... and I wanted to do it being here in India.” When he started the company he relied on interns and university students to work for him. Over time the company acquired a good reputation and, after working for him, most people would transition to better paying jobs at more established companies. He understood this, explaining that when people reached their mid and late 20s they would be getting ready to marry and needed more stability. In addition to hiring people in whom he saw potential to think differently he also encouraged employees to do community work. Although he currently has seven employees there have been as many as 26 during busier times. His entire career and to a wider extent, his life, has been defined by his commitment to free software. Dev is representative of a small but committed group of men who are willing (and financially able) to eschew security in the name of freedom.

By the early 2000s, there was a desire to start regional and national conferences to share and discuss FOSS. By 2001 the epicentre of FOSS was in Bangalore and the groups that worked with
Atul Chitnis\textsuperscript{5} and his friends who organised the annual FOSS.IN conference. Over the years this annual conference, which focussed on discussing and demonstrating Linux and FOSS based technologies, attracted thousands of participants and was one of the largest FOSS conferences in Asia, until its demise in 2012 shortly before Chinis’ death in 2013 from cancer. Even though more politically left-leaning free software activists sometimes disagreed with the purely technical focus of the FOSS.IN organisers, it is generally agreed that the conference did represent a real mainstream locus of Indian FOSS that many feel is lacking today.

\textit{Kerala and IT\@schools}
Following from the general groundswell of FOSS enthusiasm centred in Bangalore, and often touted as the seminal example of FOSS in India, the IT\@schools project in the state of Kerala exemplifies the potential of FOSS in India. Kerala, which is in the south western corner of the country, has a long history of being socially progressive and the “Kerala model” of development is often used as an example of development “done right” because Kerala boasts India’s highest literacy, health, and environmental indexes. Kerala elected the first Communist government in India in 1957 and since then has been generally left leaning no matter which party was in office at the state level. This communist heritage also makes Kerala’s government and its many trade unions naturally suspicious of Multinational Corporations (MNCs). Finally, there is a perception amongst Indians generally and Keralites themselves that they are a fiercely independent people. Perhaps it is the combination of all these factors that made Kerala a perfect environment for FOSS adoption.

In 2001, Kumar, a software engineer, was part of a small group of free software activists at university. This group of friends got some grant money from the Kerala state government which enabled them to hold a conference and invite Richard Stallman to attend. Stallman was impressed with the dedication of Keralite activists and authorized the creation of the Free Software Foundation of India (FSF-I). When the FSF-I formed they decided to begin focus on Kerala, having the most support and human resources there. According to Jai, one of the founding members of FSF-I, the idea of opening an Indian branch of the FSF came mostly from the Indian side but the FSF was interested in setting up regional groups. The Indian branch was the second international branch after FSF Europe.

The first initiative the Free Software Foundation of India took up was the migration of schools to FOSS in Kerala. When asked why they chose to focus on education first, Kumar replied:

One, we believe that free software is about values. We don’t use the term FOSS deliberately. So it’s not accidental... most of us came to free software not because of any technical reason but the political and social aspect of it. So, if our concern is primarily social then as I said free software is about values and the values are defined during your period of education. And we were not looking for immediate change or immediate impact... so we thought by introducing free software in schools we could make a mark. …Social activism is the core of Kerala’s social and political development so if today we are talking about the Kerala model with all its problems that is only because of this social radical social movements which came up in this state. And the teachers’ community were an integral part of such transformation. Considering that we thought that we could work with these teachers... and the opportunity was also created by the fact that... the government of Kerala was introducing ICT to [the] education system and they were going on the proprietary lines. So targeting that would help create a public discourse, which is what exactly happened.

Kumar’s emphasis on FOSS as an extension of social activism is significant. By showing students that opening up the source code for anyone to examine, learn from, improve, and share results in the best software, it is hoped that once students engage with the code in a collaborative manner. Further, it is hoped that they will also engage with the learning process on a deeper level. Free software activists are also trying to change students’ relationships to education, class, caste, and civil society more generally.

In the beginning the state’s IT@schools program planned to use Windows and Intel, who brought in their own trainers and text books. The government printed these text books for the teachers but the FSF-I felt that the government should not pay to print what they felt was an advertisement for Intel and Microsoft whilst also locking into a costly relationship with Windows when there was a free alternative. As it happened, one of the FSF-I founders who helped create maths textbooks for the state, was part of the IT curriculum textbook workshop convened in 2001 to introduce ICT to state schools. Kumar was invited to attend the meeting and discuss free software as an option. Kumar, in turn, asked Jai to help him create a textbook about free software. As Jai explained it to me, because he has grey hair and a beard as well as a job as a scientist whereas Kumar was just a young man, it made sense. Kumar had the idea to write the textbook in story format so Jai came up with a draft and it was sent to the council, who liked it. However, the man who had brought in Windows (who happened to be the son of a Congress party leader and it was
thus assumed he had political motives contra to free software activists who were not affiliated with the Congress party) wanted to know who would support the move to free software for 1200 schools. The textbook was rejected and this was interpreted as a politically motivated attack on Kumar himself. Kumar said this made some of the teachers very uncomfortable because they were left-leaning and generally agreed with the free software approach. Following the rejection of the free software textbook some of the teachers who were active in unions joined with the FSF-I to create parallel teacher training programs across the state, without government sponsorship. For over a year Kumar volunteered his time going around the state staying in teachers’ homes while training them to use free software. Then, through a connection with the trade unions, some teachers and he met with one of the most important leaders of the communist party, who was in his early 80s at the time. This leader decided to put his weight behind the issue and asked the trade unions to take it seriously. When the state government made Windows mandatory by having students write an exam based on Windows the teachers union called for a strike. By that time they had created public awareness through friendly media coverage and having Richard Stallman visit for a conference. This awareness, in combination with the union’s actions, forced the government to address the issue. At that time the education minister was from the Muslim League party and, according to Kumar, was a person “of integrity and clarity.” This was in 2003 and, because of the Gulf War, there was general opposition from the Muslim League to multinational corporations, which included Microsoft. All of these factors converged so that the state was ready to switch school software and education from Microsoft to free software. In 2004 it was decided that schools could choose whether to use free software or proprietary software and the state government would support either but soon it was decided that all schools would use free software.

As the IT@school project was gaining momentum efforts were made to ensure there was technical support for spreading and maintaining FOSS infrastructure throughout the state. In 2003 the activists who organised the IT@school project set up an organisation called SPACE\(^6\) to provide a facility for centralized free software education and support. After the migration of Kerala schools to FOSS, Anand, a professor at the Indian Institute of Management in Bangalore, who was researching ICT for development began studying the impacts of FOSS in Kerala. The Kerala government asked him for some policy advice and he suggested setting up a centre for all

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things FOSS. He explained that a centre was important because “If a Microsoft or an Oracle is selling you a software... they will inform you [that] nobody is behind free software, there is no company backing it...” Thus in an effort to ensure that there was adequate support infrastructure for the state’s government and industry switching to FOSS the International Centre for FOSS (ICFOSS) was created.

Delhi versus Microsoft: No Policy is also a Policy
PV, the retired bureaucrat who was instrumental in bringing the internet to the educated middle-classes in India during the 1990s was working for the Department of Electronics in the early 2000s. He was moved into the software development division in 2002 and immediately questioned a proposal that had been sent from Microsoft to every Member of Parliament in India: “I looked at it, I said ‘hang on, which is good for the country? Is this an open source? Did we look very logically at open source?’ So innocently I started a program called Linux India Initiative.” The Linux India Initiative was convened to discuss whether the government would be better served by open source or Microsoft and included representatives from central and state governments, academia, and industry, including Indian Red Hat and IBM. PV was pleasantly surprised to find that the majority of the ninety people who participated in the meetings were in favour of using Linux instead of Microsoft. The Linux India Initiative success made the front page of the Economic Times. The very next morning, two Microsoft representatives were at PV’s office. They were very upset, saying: “In the evening... Bill Gates will ...see it and now he won't come to India. He was scheduled to come; he will now cancel his trip!” PV tried to explain that it was just an initiative to see what is best for India but they would not leave. The Microsoft representatives asked him to cancel the program, which he was not in a position to do. PV took them to his boss who also did not have authority to cancel the program. Eventually PV went to the Secretary of the Department of Electronics and explained that some Microsoft representatives are upset and want to meet. The Secretary was not impressed, saying “What? Why should I meet with them? ...two-three months back they [didn’t] care about [me]... Ask them to go.” After that the Microsoft representatives left and, as PV puts it, “India never looked back after that. In [a] small way, I learned the power of the bureaucrat. ...I may be a small guy but I sit in the seat and do some things. I think that sends a message. Sends a message India is ready to stand up. ...India cannot be pushed around.”

Following his success at keeping Microsoft at bay PV began pushing for an explicitly open source policy. One day the Secretary for the DoE called him and said “You know something? No policy is also a policy.” This statement, famously attributed to former Prime Minister Narasimha Rao, neatly epitomises the central government's approach to FOSS at that time. PV explained that the Secretary was saying the Indian software industry was very sensitive and they were depending on companies like Microsoft, so instead of scaring off potential partners for Indian industry, “We quietly do what we think is correct. Why should we go in the name of a policy? By announcing policy what are we gaining? By doing the same thing without calling it a policy what are we losing?”

This non-policy approach to software acquisition by the central government clearly echoes the policy of political non-alignment from the 1950s and early 1960s. And although that comparison may sound trite, the software non-alignment policy was just as unique in the early 2000s as India’s political non-alignment was during the cold war. Nitesh, a Bangalore based NGO director explained that while many national governments had positions that were pro or anti Microsoft, India’s strategy emerged and developed:

The third type of position was to have a silent, dynamic position. It’s a non-written dynamic position. So on one day they would say ‘India’s going to adopt free software, everything in going to be free software’ and next day Microsoft will arrive, Bill Gates will arrive and say we’re going to build a big hospital here in this place and then they cool off for some time and then they say it again... So it used to be the case that our policies were unwritten and dynamic and there was a very strong sense that free software was the way to go but we also did not want to upset the big proprietary companies because many of their partners were Indian software companies.

Although the policy was not stated, the central government was definitely interested in seeing how it could best utilise FOSS. In the early 2000s the Ministry of IT organised a project in which the Centre for Development of Advanced Computing (C-DAC) Bombay, IIT Bombay and IBM partnered to set up back end technology for FOSS. IBM provided a lot of equipment and almost all financial support, C-DAC (which was still the NCST, National Centre for Software Technology at the time) had interest in developing tools to use in India, including in Indian languages and IIT Bombay was interested in forwarding research. The project only lasted three years but the people who were involved invariably moved on to other FOSS projects. So, as India moved into the 21st Century the government’s software policies evolved, and generally favoured FOSS. However, as we will see below, these developments did not follow a straight
forward path and were sometimes inhibited by contradictory policies, practices, and practitioners.

2004-2014: Growth and Divergence
Between 2004-2014 the Indian FOSS community experienced both growth and divergence. The LUGs started in the late 1990s were going strong, the central government invested funding into FOSS projects and created the National Resource Centre for Free and Open Source Software, the Microsoft Open XLM debates ensured continued government and industry support of FOSS and new programming languages increased the utility and scope of FOSS. At the same time, software patent law was introduced and the Software Freedom Law Centre was opened in New Delhi.

The Founding and Floundering of the NRC-FOSS
Around 2003 the Ministry of IT wanted the joint project they had orchestrated between C-DAC Bombay, IIT Bombay and IBM to become a national effort. Under the umbrella of the Centre for Development of Advanced Computing (CDAC), the NRC-FOSS was designed, funded, and formed. The NRC-FOSS was opened in 2005 with the twin goals of “bridging the digital divide as well as strengthening the Indian Software industry.”\(^8\) The NRC-FOSS was envisioned as a kernel through which a network of government, academic and industry stakeholders could develop and spread FOSS throughout India. C-DAC was encouraged to get academic and industry partners so it was not just a government project. The NRC-FOSS was housed in AU-KBC Research Centre, which is a public-private-partnership (PPP) institute founded by an engineer who did well for himself working in the US and wanted to support interdisciplinary research at his alma mater, the Madras Institute of Technology. The AU-KBC is on the Madras Institute of Technology campus in south Chennai and is also affiliated with Anna University, which is responsible all college and university curriculum within the state of Tamil Nadu.

The NRC-FOSS was designed to have three phases of implementation, with each phase lasting several years. The goals of phase I were twofold: developing an Indian version of Linux and evangelism, particularly in higher education curricula. One of the first projects was to introduce FOSS as an academic subject. Because one of the Centre’s partners, Anna University, controls the curriculum for about 300 engineering colleges in the state of Tamil Nadu the plan was to use this connection to introduce FOSS into computer science programs. To create awareness and interest among students the NRC-FOSS project staff visited colleges (30-40 in first year directly),

partnered with the LUG at IIT Madras to do workshops and lectures, encouraged students to do final year projects with FOSS and then also get a certificate from the NRC-FOSS. In hopes of reaching about two thousand students per year, 100 lecturers from 30-40 colleges were given two weeks of training on FOSS by industry experts and IIT professors.

Ramakrishna, one of the original NRC-FOSS directors, explained that despite these efforts the impact was not actually that high; of all colleges who sent lecturers for training, only twelve took up a FOSS course. Lecturers felt that teaching a non-Windows based class would not help them or their students get work. Ramakrishna said these lecturers did not appreciate how unpolished Linux looks compared to Windows and, to be fair, between 2005-08 there were not as many varieties of Linux and they certainly were not as user friendly as they are now. He explained that at that time Linux enthusiasts tended to be computer science experts who started out with Unix, were comfortable with command line mode, and did not like the slick packaging of Windows or Mac. As it turned out, the NRC-FOSS found that many computer science lecturers in Tamil Nadu were not comfortable working in command line modes so using Linux would highlight their relative ignorance. Additionally, lecturer retention in Tamil Nadu (and nationally) is very low; Ramakrishna told me that even if you train a lecturer this term, they may move on to another job/school the next month or, if they are women, may get married or have a child and then quit. So only a few hundred students in the state of Tamil Nadu were actually reached the first year. However, the few colleges that took up the course on FOSS as an elective really committed to it (and are still committed today) and the students who took the course reported getting jobs because their exposure to Linux demonstrated their ability to learn and absorb new technologies. Although the promotion of FOSS throughout Tamil Nadu was not as wide spread as originally hoped it did plant a seed that was able to grow.

The other main goal of Phase I, the development of an Indian operating system, was also moderately successful. Developed with NRC-FOSS but mainly out of C-DAC Chennai, the Bharat Operating System Solutions, or BOSS Linux, was heralded as India’s first indigenous operating system and was made available in eighteen Indian languages. Government offices were encouraged to use BOSS Linux and there was some uptake but it never became an especially popular choice because if one did not want to use Windows there were already many other excellent versions of Linux available with more developed communities to troubleshoot and
improve the software. So, although it was not as resounding a success as hoped, during Phase I of the NRC-FOSS traction was gained with the development of BOSS and starting government and school engagement with non-proprietary tools.

Phase II, which started in 2008, targeted schools, e-governance applications, back end data centres, cloud computing, and Indian language software. Additionally, a FOSS based Master’s program designed for working professionals was developed by the NRC-FOSS and run through Anna University. Although these goals were all at least partially met – in collaboration with the C-DAC departments in Chennai, Bombay, and Bangalore the NRC-FOSS created Indian language versions of Open Office as well as security and performance issues – there was not much enthusiasm for the project amongst those now in government or indeed amongst the wider FOSS community. Although a Phase III was planned, it was not funded and the NRC-FOSS was disbanded in 2012.

PV, who during phase II of the NRC-FOSS was a C-DAC director, told me that by the time phase III was meant to start these issues were generally understood and it was felt that the NRC-FOSS was not able to adequately address them at the time. Nandan, an IIT professor who chaired the project review and steering groups for phases I and II, summed up the NRC-FOSS thusly: “I would not, to be honest, call it a resounding success but I would say that without this we would not have reached anywhere close to where we are. So they were the critical factor in ensuring that we stayed current.”

Legal Wrangling: Patents, the Software Freedom Law Centre and the OXML Debate
As noted above, although the NRC-FOSS was diligently working to spread FOSS, outside of Kerala there was not yet much open support for FOSS from government or industry. Two of the major factors which helped spread and growth of FOSS in India were the debates over Microsoft’s OXML standards and the inception and work of the Software Freedom Law Centre in New Delhi. Below I will outline how some of the people who were working on software standards and patent laws between 2004-14 were able to ensure a healthy ecosystem for FOSS development, despite the push-back they faced both from within and outside of India.

Some in the Indian IT sector and many from the MNC sector who outsourced IT work to India but also hoped to sell software to the growing middle class were in favour of introducing software patents, which are not commonly used outside of the US. Although the FOSS
community has been key in mobilising push-back to repeated attempts to patent software in India, much of the credit for the success of the push-back must be given to the Delhi office of the Software Freedom Law Centre (SFLC). The SFLC was founded in 2005 in New York by Eben Moglen, a coder turned lawyer. The purpose of the SFLC is to protect FOSS projects through pro bono legal services and policy advocacy that promotes and expands FOSS. The Indian office, SFLC.IN, which is led by Mishi Choudhary who practices law in New York and New Delhi, was opened in 2010 and now has five full time lawyers who focus on FOSS and related issues.

Dinesh, a self-described “open source evangelist” spent much of his career at Red Hat India fighting the OXML standard. The OXML standard was created by Microsoft and encompasses the rules by which documents are formatted. Microsoft wanted to make the OXML standard the official standard in India. In 2008 the IITs and the Ministry of IT were involved in debates about what electronic document standards India should adopt, as were industry including Red Hat, Sun Microsystems, IBM and Microsoft, government, non-profits, and industry associations like NASCOM. Dinesh told me that even people who used to support Microsoft started to question why the company was spending so much money lobbying for a somewhat obscure issue. He explained that once you start unpacking the issue the dangers of getting locked into proprietary standards are clear. With each successive version of the software some data will be lost whereas with open standards that is not the case. According to Dinesh, the press thought this was too complex to write about, however a journalist did write a story about it, which made the front page of the Economic Times. The subsequent media pressure after the Economic Times reported on the debates shifted several government bureaucrats and industry leaders away from Microsoft and towards Open Standards. All the MNC companies (except Microsoft) voted against the standard whereas all the Indian IT service provider companies (for example, Infosys) voted for it, knowing their businesses depended on support from Microsoft. Ultimately there were thirteen votes against adopting the OXML standard versus five for. Dinesh emphasized that at the time, 2008, defeating Microsoft in the name of national autonomy and security of data was a huge victory for the FOSS community. Several other informants also told me that it was significant that Microsoft’s OXML standard was defeated because the standard would impact the

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storage of citizen’s data and the longevity of such data, which remains salient for hundreds of years (for example, birth and death certificates).

**2015-17: Accepted Technology, Contested Ideology**

Following the rise and fall of the NRC-FOSS, global innovations in the technology, legal battles, and quiet government support, the Indian FOSS scene has grown and changed in many ways. By 2017 it could easily be argued that FOSS has won its battles for technical acceptance and use. FOSS technologies are used to power most of the world’s smart phones (Android) as well as the world wide web, and countless back end systems needed to run most governments and businesses. The global FOSS community itself was experiencing explosive growth with the development and popularity of several FOSS programming languages and applications including PHP, Python, Ruby, and Django. Even Microsoft has started opening up some of its code to better integrate with the community. Indeed, acceptance of FOSS has become so universal that in 2015 the Indian central government made its preference for FOSS official with a policy for adoption of “open source software” for government offices. Despite these many gains the Indian FOSS community is split along several lines: new programming languages became sub-cultures who did not necessarily align with “FOSS” as an ideological issue, the free software and open source software communities moved further apart, and the politics of and for FOSS heated up with engagement in civil society issues and arguments amongst different free software activists about how best to move the technology forward in the Indian context, resulting in fission amongst south Indian activists.

**Technology versus Ideology**

The growth and popularity of FOSS languages and applications has resulted in the general acceptance of FOSS within the IT industry but, ironically, it has also led to a fragmenting of the FOSS community. When Linux became popular in the 1990s, enthusiasts may have come to FOSS from a technical or philosophical bent but they were working with and promoting very similar software. By 2005 there were many sub-genres of FOSS which heralded what Nitesh, a long-time activist, called “death of the renaissance movement in FOSS.” When asked to expand on what he meant by this he replied:

> It’s impossible now for you to hold an event that appeals to a wide set of people because there’s massive amounts of super specialization. So the communities are very healthy – individual communities – and they have big meetings and well attended and the content is high value and therefore you can tell that as Indians we are moving up the value chain –
we are contributing more and more and more. But the good old days... the pre 2005 years when Bangalore Linux User Group used to meet as one or Delhi Linux User group used to meet, that’s over... So I don’t think we need to mourn the death of the city wide free software user groups or Linux user groups but the trouble, the loss is the moment people focus only on the language or technology or the framework, Django for example, than the broader implications for democracy and civil liberties tends to get lost. What used to be really interesting about the LUGs was that they were politically very, very aware... The Delhi Linux User Group’s motto... was ‘to explore freedom in all walks of life, including software.’ So that is the kind of idealism that is lost when it becomes basically skills development and it becomes mostly corporations sending their developers to a particular event because they basically need them to get on top of certain skills. So that’s a bit of a loss.

Nitesh’s concern that the rise and success of FOSS has also been the demise of a community with a shared ideology was echoed by several others I met. While everyone agreed that the general acceptance of this technology was a good thing, some long-time members of the FOSS community are sceptical of the newest generation of FOSS enthusiasts. Some of the scepticism is perhaps based upon generational nostalgia but there is also concern that as the technology changes and fragments into sub-cultures, the social potential of the technology is also weakened. Of course the debates over what to call this technology – free software, FOSS, or Open Source – also align with these changes in the community. Below I will outline how these differences have manifested in two national FOSS conferences: Open Source India and 4CCon.

Advertised as “Asia’s #1 Open Source Convention” the Open Source India conference I attended took place during October of 2016 in Bangalore. This two day event was held in a large, modern convention centre. As I entered the building there was an information desk with maps and schedules right at the centre of the main hall. To my left was the Microsoft booth. There were two young women at the desk and they showed me stacks of binders with programming tests – you could take one and go into the room behind the desk to see how fast you could pass the test. By contrast, the booths of other sponsors were manned by company employees. There were about 15 such booths, all sporting signage, fliers, business cards and many also had TV monitors showing company information or technology demonstrations. Dev’s start-up, mentioned earlier in this chapter, also had a booth.

Most of the speakers for this event were from industry with a few representatives from C-DAC. Most of the talks were about the speakers’ company’s projects. For example, there was a

presentation by a man who discussed how his company makes some parts of its product open
source and other parts of the product closed-source to sell at a premium rate to make a profit. The
director of C-DAC Mumbai gave a talk about the challenges of open source in India but mostly
discussed projects C-DAC has undertaken. He emphasized the importance of no cost software
for government. There were some questions from the audience after his talk. A young man asked
about the differences between open source and free software. The speaker said there are “moral”
differences and that it was up to every person to decide which to follow.

In January 2017 the Free Software Movement of India (FSMI), a coalition of regional free
software organisations, hosted the 4C conference at a private university in south Chennai. This
was the second national conference organised by the FSMI, the first was held in Bangalore in
2010 shortly after the FSMI formed. The purpose of the 4C conference was to bring the national
free software community together to discuss and organise around four “C”s: Collaboration,
Contribution, Community, and Commons. The first day of this four day conference focussed on
technical workshops wherein FSMI members provided technology specific tutorials, aimed at
students; the following days focussed on presentations about the relationships between
technology and society generally. While some speakers were affiliated with the IT industry many
more were affiliated with government, academia, news media, and civil society organisations.
The subject of the opening talks included “The Political Economy of the IT Industry,” “A
Changing Landscape,” and “Dreams of Future?” All of these talks emphasized the need to be
critical of the political implications of the IT industry.

I am sharing descriptions of these two conferences because the neatly represent two broad
ideological streams of FOSS in India: Open Source versus Free Software. Both conferences had
several thousand attendees and high profile sponsors; however their ideological projects are quite
different. That the Open Source Asia conference was held in a modern convention centre and
was focussed on how best open source software can be leveraged by and for the Indian IT
industry reflects the alignment of open source software with business via so-called neutral,
technical goals. That the 4C conference was held in a university and was focussed on how best
free software can be leverage by and for Indian society reflects the alignment of free software
with explicitly political goals. However, the fact that there were government speakers and
representatives of local start-ups at both also reflects that there is still (some) room for a pan-
FOSS movement where both sides of this ideological divide meet and sometimes work together.
Politics of/for FOSS in India

During the 2000s as India’s IT industry grew so too did civil society organisations critical of unfettered expansion of technology and MNCs. In addition to the Software Freedom Law Centre discussed earlier, in 2008 the Centre for Internet and Society was founded in Bangalore to foster academic and policy research on the social implications of the internet. In recent years both the Centre for Internet and Society and the Software Freedom Law Centre have organised around general IT and civil liberty issues including demonetization in 2016, a biometric identification system called Aadhaar, Section 66A of the IT Act, which was used to arrest people for voicing criticism of the government over the internet (for example on social media), and the net neutrality debates which were instigated when Facebook wanted to offer “free” but limited access to the internet to India’s poor. The Software Freedom Law Centre uses a lot of their resources to legally represent these issues though lawsuits and offers pro bono defence for people who get arrested. Although these opposition movements were composed of broad bases of leftists and not exclusively organised or populated with FOSS activists, almost all FOSS activists were involved. The intersection between the Indian FOSS community and civil liberties will be explored further in Chapter Seven, but for now it is important to note that to many FOSS activists civil liberties are intrinsically related to the FOSS philosophy.

Although the entirety of the FOSS community from open source to free software will come together to rally around some political causes such as net neutrality, political in-fighting amongst the community has also occurred. When I asked about political affiliations within the Indian FOSS community I was often assured there are FOSS supporters across the political spectrum. I was advised that a good way to gauge someone’s political leanings was if they used the term “free software” or “open source,” with left-leaning people tending to use the term free software and right-leaning people being more likely to choose open source. Regardless of what people call this technology, factions of all India’s major political parties (Congress, BJP, CPI-M) are pro-

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13 On the evening of November 8th, 2016, at 8pm Prime Minister Modi announced the demonetization of all ₹500 and ₹1000 banknotes, effectively eliminating over 85% of the nation’s currency. Ostensibly, demonetization was enacted to purge the economy of undeclared cash, so-called “black money,” resulting from corruption and terrorism, which has been estimated to make up between 25-75% of India’s GDP. By June of 2017 almost 99% of this supposedly black money was deposited back into the Reserve Bank of India, indicating that very little if any “black money” was rendered useless: https://thewire.in/banking/demonetisation-99-of-scrapped-notes-came-back-into-system accessed 7/06/2018.
FOSS, though none so much as the communists. However, the Communist Party of India Marxist (CPI-M) has also been involved with in-fighting amongst south Indian free software activists, as is discussed below.

One of the most active FOSS organisations in the country the Free Software Movement of India, or FSMI, is a break away from the Free Software Foundation of India (FSF-I). Ajay, an activist from Bangalore who has been involved with the FSMI since its inception, shared the FSMI origin story. In 2010 there were several groups in south India: Swecha in Hydrabad, FSMK in Bangalore, FSMTN in Chennai, and the Democratic Alliance for Knowledge Freedom (DAKF) in Kerala. These groups wanted to unite as an all-India movement under the banner of the FSF-I. However, Ajay told me that the FSF-I did not want to lead a democratic Indian free software movement, and that Richard Stallman wrote them to say that if they wanted to start their own group to go ahead but that the FSF was not going to change its structure. So the FSMI was formed, as a fork of FSMK, in their first conference in Bangalore, which over two thousand people attended. Ajay told me the sub-groups which make up the FSMI work with each other as well as with many other groups such as LUGs to put on events. In 2012 they branched out of south India and formed FSM-Maharashtra.

Kumar, who is based in Trivandrum and had been instrumental in the IT@school project, told another version of the FSMI origin story. Kumar said the success of the FSF-I in Kerala inspired the CPI-M to start organizing around free software. This initiative came from a man who had been involved with FSF-I who then decided to replicate what had happened in Kerala in Hyderabad and then in Bangalore and Tamil Nadu. Despite being in agreement with the left generally, Kumar felt explicit alignment with a political party would hinder the free software movement. He explained that there used to be a very active and successful group in Kerala called the People’s Science Movement but that the CPI-M took them over as an arm of the party and in so doing took away the dynamic spirit of the organisation. He did not want the same thing to happen to the free software movement. His refusal to sign on to this alliance created so much conflict that he quit working with the free software movement for several years. Although Kumar has resumed his work with free software, he said there is still a divide between different factions in the community and this is evident in that he was not invited to the 4C Conference.
Conclusion
In this chapter I have traced the history of FOSS in India as, in large part, a manifestation of both personal and national autonomy. Under colonial rule science and technology were used by the British under the rhetoric of “civilizing” the subcontinent but the technological infrastructure the British built in India primarily enabled Britain to more easily extract, move, and take away valuable natural resources. During the Independence movement there was active debate amongst nationalists about how science and technology could or should look like in India. Following Independence was a prolonged phase of nation building which included investment in technological infrastructure to modernize the nation. Investments in technological infrastructure also included the establishment of world class technology-centred universities, the Indian Institutes of Technology. The post-Independence political non-alignment policy established India on the world stage as an autonomous nation. During the 1960s and 70s the central government restricted most technology imports which, in combination with government sponsored elite technical education, spurred a self-reliant techno-culture. With IMF enforced economic liberalisationin 1991, the nation’s borders opened up to trade as well as multinational corporations. Many existing and new Indian IT businesses were able to thrive thanks to decades of government subsidised infrastructure and technical education which they were able to leverage to take full advantage of the outsourcing phenomenon. The Indian IT industry boomed and helped spur economic growth and the middle class grew; however these successes have not been celebrated uncritically.

The development of the Indian FOSS community must be understood as a reflection of this history. Indeed, with its initial advance, twists and turns which include pragmatic silences and alliances as well as political victories and in-fighting, the Indian FOSS community has always been in conversation with larger issues of what role technology can or should play in Indian society. The ideological fusions and fissures discussed by my informants are related to both politics with a small p, that is how best one should interpret and work with the technology as reflected in differences about priorities, organisational modes ideologies – i.e. whether FOSS is best understood as a mainly technical or philosophical project – as well as politics with a capital P which include national technology policy and alliances with specific political parties. In the next chapter I will explore the personal motivations for evangelising FOSS in India by showing how members of the Indian FOSS community develop and deploy FOSS to improve their nation.
Chapter 3 – Evangelising FOSS: Indian FOSS as an Ethical Project

Introduction
In the West, active membership in the FOSS community is largely based on contributing code to FOSS projects. Contributing to a project not only grows the technology it also allows one to grow their involvement in the community itself by contributing good code and, with increased reputation, joining project management where one can then steer the technical directions of the project and, in so doing, further enhance their reputation within the community. I often asked my informants if they thought there was anything unique about FOSS in India. Many would quickly say there was not, that the technology is the same no matter where it is made or consumed. But, after some thought, almost everyone would add that one thing unique about FOSS in India is that, despite a high proportion of Indian IT professionals, India consumes far more FOSS than it produces. After several attempts to quantify this I had to conclude they were correct. At first I found this odd. Though a relatively small group, the Indian FOSS community is extremely passionate. They spent much if not most of their free time in efforts to spread FOSS through Linux User Groups, campus talks and training sessions, projects to close the digital divide, and lobbying officials with the power to implement FOSS on a large scale. In other words they were doing software evangelism.

Software evangelism is a form of proselytizing in which the evangelist uses rhetoric to try and convert users to a particular software. This method of technical conversion has been recognised since at least the 1990s and software companies regularly employ people under the title

15 It is difficult to quantify exactly where the most FOSS contributions come from but there have been some attempts. A study using Github data found that the vast majority of FOSS contributions are made in the US with India in 8th place. When contributions are weighted by national population, the US slides down from first place and India disappears. https://medium.com/@hoffa/github-top-countries-201608-13fe642493773 accessed 30/3/2018.

However, the above study uses total national population, which would easily put India at a disadvantage as its population is over one billion. A more meaningful measure would be contributions by population of software engineers per nation. That said, India does have a high population of software engineers. If we look at raw numbers of software engineers, India has roughly as many as the US and will soon have many more: https://www.computerworld.com/article/2483690/it-careers/india-to-overtake-u-s-on-number-of-developers-by-2017.html accessed 30/3/2018.

The key finding for my purposes is that there are many countries with lower populations and proportions of IT professionals than India who produce more FOSS than India. That said, the validity of this measure can be questioned. The nation a project was created in does not necessarily account for nationality of the developer. In the case of Indian IT professionals, many of whom work abroad, this may change the picture. However, as my interest is with FOSS inside India, these data do give a fairly good indication that, proportional to the number IT professionals generally and FOSS advocates specifically, relatively little FOSS is created in India.
“evangelist.” Although evangelism can be a paid position it can also be done on a voluntary basis. While Western FOSS advocates do evangelise it is not to the same degree as contributing to FOSS projects is paramount; however, among the Indian FOSS community more time and effort is spent evangelising FOSS than creating FOSS. In this chapter I will explore how evangelism is carried out within the Indian FOSS community and, in so doing, will argue that Indian FOSS must be understood as an ethical project that simultaneously seeks to contribute to and critique the nation, specifically the education sector. To do this I will begin with a discussion of conversion stories and why converts are often compelled to evangelise. I will then outline the spectrum of FOSS evangelism in India and its attendant political affiliations. Finally, I will explore how ideological purity is constructed, practised and contested within the Indian FOSS community.

Conversion
The aim of software evangelism, like that of religious evangelism, is conversion. Generally understood as the act of joining a new faith community, the concept of conversion is often synonymous with religious, especially Christian, practice. This interpretation can hamper the analytic scope that the concept of conversion offers. In an effort to bypass these restrictions Asad offers a useful alternative definition: “...in studying conversion, one was dealing with the narratives by which people apprehended and described a radical change in the significance of their lives. Sometimes these narratives employ the notion of divine intervention; at other times the notion of a secular teleology” (1996: 266). As my informants’ own narratives about discovering FOSS make clear, the shift from proprietary to free and open source software can lead to life changing shifts in moral orientation not only when it comes to software but also in relation to wider socio-economic concerns. In this way successful software evangelism is very much like religious evangelism in that, if successful, it will produce individuals who are reborn into a new moral orientation that will affect important life choices including how they approach paid and volunteer labour. Many of my informants would use the idiom of religion when discussing their commitment to FOSS. Even Richard Stallman jokingly refers to himself as St IGNUcius. In this section I will detail conversion stories told by my informants and explore the

16 For an in-depth history of software evangelism see Maher (2018).
ways in which my informants worked to share FOSS with others and, in so doing, grow the community.

**Finding FOSS**
The road to FOSS often starts with a lone software engineer who, after identifying a technical problem or issue, finds a FOSS based solution, which then leads the protagonist down a path ending in full conversion. This is what happened to Gopi, a 32 year old IT professional with a quick smile and seemingly boundless energy. Gopi, who works at an IT start-up, is a stalwart member of the Chennai FOSS scene. He was usually at the ILUGC meetings, and his name came up again and again in my inbox because he was always sending emails out about opportunities to contribute to projects and upcoming events via local FOSS listservs. One evening in May 2016 he came by the AU-KBC to talk with me about his work in the FOSS community. He brought along his two year old son, who happily crawled around the conference room during our interview. Gopi’s introduction to FOSS started when he was in college studying instrumentation engineering. He was searching for a cheap alternative to MATHLAB, which is an expensive software application used to perform rigorous calculations. He needed this program to complete his final year project but his college didn’t have it and he and his classmates were shocked at how expensive the licence was.

We were searching for any free solutions and then we found Octive, so the same code…. We thought wow... this guy’s selling software for lakhs and lakhs but this guy’s giving for free on open source... Then I explored it… the Intel operating system is there, how is this happening, I cannot believe it! And I thought that these guys are cheating! [laughs] Then I started to read and read and read and... then I found there is a group called Chennai Linux User Group. I joined that group and initially I don’t know what they are discussing but still I keep on getting the emails. Somebody… shoot[s] an email ‘Two day free… class for shell scripting in basic Linux, come to my home I will teach you.’ Then I thought… operating system is free, training is free, go and enjoy it! I went to his home, he introduced me to the philosophies, why people are doing, it’s not just an operating system, it’s a lifestyle of many people. Then I got inspired and I chose that path, take the red pill! [laughs] That’s how I jumped into the FOSS.

FOSS has become a lifestyle for Gopi. Now, in addition to working full time and co-parenting his toddler, he also helps organise the ILUGC meetings, volunteers with the FSFTN, created and

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18 In India both universities and colleges are post-secondary education. The difference between a college and a university is that universities are (for the most part) administered by the central or state government whereas colleges are administered by the universities.

19 1 lakh = 100,000 rupees.
runs a project that provides free e-books in Tamil, and provides FOSS training to students back in Kanchipuram, his native town. He has chosen to work in FOSS-only companies and spends all the free time he can spare apart from his family to understanding and evangelising FOSS. Fortunately for him his wife is a software engineer and FOSS convert who contributes to the community as well. It may be that Gopi is the kind of person who would whole heartedly commit to any philosophy he found inspiring but the philosophy that inspires him and guides how he uses his spare time is FOSS.

Gopi’s invocation of the “red pill” is instructive. The red pill is a popular culture meme that originates from the 1999 science fiction film The Matrix. The film’s protagonist, Neo, discovers that the life he has been leading is an elaborate façade. After the initial discovery that his life is not what he thought it was, a messianic figure offers him two pills, a red one and a blue one. Neo is told that if he takes the blue pill his life will remain as it has been, comfortable but not based on reality. If he chooses to take the red pill he will experience true freedom and learn the truth of reality, which can be both liberating and brutal. Implicit in taking the red pill is accepting personal responsibility to extend freedom to everyone, even if they aren’t aware they do not have it.

For Kabir, a Bangalore based IT professional, conversion happened after university. He was doing freelance jobs and happened upon one that required Linux knowledge. The more he learned the more he felt this was the best way to make software. Although he didn’t join any FOSS-centric organisations he did seek out Linux based work. When I asked him what using FOSS means to him, he replied:

Because I am free, I can think more clearly. When I am restricted... in a box, where I am surrounded by thousands of legal issues, thousands of corporate agendas, where they have mindset of making profit rather than doing something for society – it may work for some people but it may not work for FOSS people.

Kabir’s assertion that FOSS provides the personal freedom to think more clearly with the implication that this ability will allow him to produce better software is one any FOSS enthusiast would readily agree with. Similarly, his aversion to “legal issues” and “corporate agendas” would not only be endorsed by any FOSS enthusiast, but by many from an engineering perspective. Kunda argues, and my informants more or less agree, that engineers often express an inherent distrust of management writ large, even though management is a common career path
for engineers. Significantly, this distrust is not based on criticism of management per se but, rather, on an assumption that the concerns of management are, by definition, too far removed from the design and production process to provide accurate or efficient guidance to those who actually work with the technology (Kunda 1992). Kabir’s frustrations with the constraints inherent to working with proprietary software, then, are understandable from this perspective. What is striking is his assertion that proprietary companies “have a mind-set of making profit rather than doing something for society.” Questioning the profit motive aligns with general FOSS philosophy but Kabir’s inference that software should be doing work for society is novel from a Western FOSS perspective.20 This is not to say that Western FOSS advocates do not feel this technology can and does do work for the general social good, they certainly do. The difference is that for Kabir and many other Indian FOSS converts, there is an explicit expectation that FOSS, because it is often free of cost, should be used by the Indian government specifically and Indian citizens generally so that limited financial resources can be better utilised elsewhere.

I heard many conversion stories in which the discovery of FOSS not only changed how people created and used software but also the kind of work they would do and how they would spend their free time. For example, several of my informants would only do paid work at FOSS based companies, thus eliminating many opportunities for prestige and profit. For those who were not willing or able to make such choices when it came to employment, evangelism became an important means of expressing their commitments to FOSS. Further, for many, a commitment to FOSS was a co-commitment to distinct forms of community and nation building. While FOSS does not define the lives of each member of the Indian FOSS community to the same degree as it does for Gopi, most members of the Indian FOSS community imbue their commitment to this technology with more meaning than they would a hobby. Indeed, FOSS is more than a technology; it is better understood as what MacIntyre calls a practice.

For MacIntyre, a practice involves developing skill in an activity, such as playing a sport or painting, which “…involves strands of excellence and obedience to rules as well as the achievement of goods” (1981: 31). “Goods” can be external (wealth, fame) or internal. Internal goods can only be gained in the pursuit of excellence through the practice itself and should result

20 While Western FOSS proponents have no issue with making money through FOSS, so long as the four freedoms (to see, use, modify, and distribute code) are adhered to, profit as the sole motive for working with FOSS would be considered inappropriate as passion for FOSS, as a philosophy or just as a technology, is considered the defining characteristic of membership within the general FOSS community.
in improvement of the standard of the practice for the community of practitioners (MacIntyre 1981: 32). To commit to a practice one must submit to the best standards of the practice and accept that they may only ever derive internal goods. FOSS is very much a practice in which individuals are committed to developing excellence in software programming through sharing their code for all to see, share, reuse in any way deemed appropriate, and, if the code is done well enough, it can set new standards of excellence within the practice and lead to external goods such prestige and even wealth. Of course what makes FOSS a true practice is that although practitioners may strive for these external goods, the internal goods of advancement within the practice through honing the skills necessary to participate in the practice is reward in itself.

Conversion to FOSS in India involves not only the adoption of FOSS as practice, it also stretches the philosophy of sharing and contributing to cover an ethical position about how Indian institutions should use software. Useful to this discussion is the concept of forking, a fundamental part of FOSS practice. Forking is the process of copying software code and altering it to a new purpose. The Indian FOSS community is forking the FOSS philosophy to better represent the needs of a developing nation. The adoption of FOSS as practice will lead to making contributions to the FOSS community, the ethical forking of FOSS in India leads to using the FOSS community to further social and economic agendas. It is this harnessing of FOSS to address larger social commitments that inspires much of the FOSS evangelism in India.

**From Convert to Evangelist**

Just as conversion follows from successful evangelism, evangelism often follows from successful conversion. Useful for this discussion is Elisha’s conception of “moral ambition” as a frame which acknowledges that all individual aspirations to live a good life share an “...inexorable orientation toward other people and their inalienability from social networks and institutions in which standards of personhood are constructed” (2011: 18-19). FOSS is a technology that, by design, necessitates sharing of code so that the technology may grow and become better. For many in the Indian FOSS community, this invocation to share code naturally leads to an invocation to share FOSS and its philosophy so that institutions, social, educational, and governmental, can grow and become better. As Gopi told me, “That is the human thing right? If you went to a good movie... you cannot be quiet, you will be telling to your friends ‘hey this movie is good!’...It’s like that… it’s good for the culture this is good for the city and no money and… freedom.” Of course, what is natural for Gopi is a reflection of his moral ambition, which
is of course shaped by his social worlds. He thinks FOSS is the best technology and is enthusiastic about sharing it. More than this, though, he thinks this technology should be harnessed for the betterment of his community, which includes software engineers and Tamil speakers. To that end he spends a lot of time teaching others how best to understand and utilise FOSS.

The methods and motives of FOSS evangelism are varied. Some evangelise because they feel compelled to pass on something they find intrinsically fascinating and technically superior, some evangelise in an effort to improve the education system and some evangelise as part of a broader political commitment to socio-economic change. FOSS evangelism in India weaves together these personal moral ambitions associated with FOSS as practice into an argument that technology generally and FOSS specifically should be used for the public good.

Dev, who runs a FOSS start up in Bangalore, feels evangelising at colleges and universities is important. He wants educational institutions to have control over their software systems so, by understanding how the technology works, they can modify it as needed and cut vendor dependency. He wants students to incorporate the FOSS philosophy into how they interact not only with technology, but also with society at large. However, he believes that conversion is a much deeper process than technology adoption:

It’s not something that can be fostered in an extrinsic manner. In a way it has to come from within. If you want to develop free software as a belief system somewhere it has to connect with the person’s personal beliefs, you know about why is it important for me to be in control of my technology? Why is it important for technology to be hackable?

For Dev, the internal goods associated with FOSS as practice are paramount. He has embraced free software as his belief system and he uses “should” quite a lot when describing how one should use technology so that one takes responsibility for the tools they use and create. During our discussions he lamented that it is “ignorant” and “sad” that, even after he spends days talking to people about how free software will help them with better technology and will enable better technologists, people still make “wrong” and “short-sighted” choices about software, opting for proprietary software over FOSS. He believes that in addition to including “vested interests” in software procurement decisions there are also people who just do not have faith in their ability to maintain their own infrastructure. These people would rather outsource the work of maintaining
a school’s technology. While discussing the wrong choices people in charge of colleges make, he added:

This is not even about free software. This is about my right of self-determination, which implies freedom, right? So if I want freedom in my own institution I will make these choices. But if I’m not making those choices it also means that I don’t value freedom so much. And that’s a problem with the belief system that I bring to my institution [as a leader].

Dev’s commitment to free software is not only a commitment to his own right to self-determination, it also frames his views of individuals and institutions who do not make the same commitment to themselves and their students. As such, it is important to recognise that Dev’s “right of self-determination” must be understood not as a neo-liberal notion of personhood but is more akin to Durkheimian moral individualism discussed in the Introduction. Though other evangelists did express frustration when their efforts did not result in conversion, no one seemed to take it as personally as Dev. In this way, Dev’s devotion to free software as an expression of self-determination should be viewed as an extreme within the wider Indian FOSS community. As we will see below, although FOSS evangelism is an important aspect of many peoples’ moral ambition, it is not necessarily as central to self-conception for most people as it is for Dev.

Sam, who heads the IT department at a hospital and helps run the ILUGC, spends much of his free time evangelising to college students. He is particularly concerned that Chennai based FOSS projects get the support they need to thrive and grow. When I asked him what motivates him to spend so much time and energy evangelising he explained, “I’m taking so much of software for my use but what am I going to give back, right? In proprietary I pay money but here what do I have to pay? The community service.” Sam’s commitment to community service is not exclusive to FOSS, he also has a keen interest in “Indian heritage” and volunteers at temples to lead tours, reading and writing Tamil inscriptions for religious tourists. Both the FOSS evangelism and religious tourism Sam participates in are very much tied to his moral ambition to be an active community member.

Of course, not all FOSS converts spend their spare time evangelising. However, even amongst those who do not participate in community building exercises like organizing LUGs or giving talks to students, there is a general sense that it is important to share FOSS. Rav, a computer science professor at an IIT, explained that without FOSS he could not have done his research –
he simply could not afford to buy MATHLAB and other proprietary software he needed to do his work. Using FOSS, he has been able to build a very successful career, for which he is grateful: “I want to give back… but it’s not a quid pro quo thing, it’s more like you have the sense of gratitude and you want to share the love… and then it went to ‘hey, you know I can actually contribute,’ so whatever I do now I try to make it open source…” In addition to contributing FOSS back into the global FOSS community, he also participates in local FOSS groups and events, though he clarified that he is not as “religious” about FOSS and evangelism as he was in his younger days.

Sanjay, a software engineer in Bangalore, learned about FOSS during an internship at a FOSS based company during his senior year of college. Even though he attended a prestigious engineering college in southern Tamil Nadu, none of his lecturers was aware of FOSS. Before he graduated he took it upon himself to teach FOSS to some of his lecturers and, after graduation he chose to work at a FOSS based start up rather than at a more established company, to his parent’s dismay. At the time he left college (the early 2000s) internet access was not reliable so students relied on CDs to download and pass on software programs. When he graduated and moved to the city he started sending CDs with Linux on them back to his college, explaining:

Some people helped me... so I thought I should reciprocate... there is nothing noble about it, just a normal thing... I felt like I get that opportunity, if somebody else gets it, it will be better for them and they sent it to some people who are their juniors also. So, for example, I sent to one person... and when he joined a company as an employee he went back to my college and trained people and referred them to google summer of code, so somebody got into google because of that, so it is like a chain.

Much like the work done by more active evangelists, Sanjay’s efforts to share FOSS with lecturers and students at his college speaks not only to the compulsion to share the ‘good news’ but also to the desire to augment the educational system. The chain of reciprocity that links and grows the Indian FOSS community is built through the active evangelism of people like Dev, Gopi, and Sam who devote much of their lives to FOSS. However, it is also fostered by the “normal” reciprocity of people like Sanjay and Rav who, though converts, are not interested in or inclined towards public proselytization. However, in their quiet acts of sharing, especially with their juniors, they are participating in promoting and spreading the FOSS philosophy, or a form

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21 Google Summer of Code is an annual program wherein Google sponsors university students from around the world to attend an intensive training program at various campuses (there are several in India) where they create a FOSS project with mentorship. Admittance to the program is very competitive.
of soft evangelism. That members of the Indian FOSS community spend so much time evangelising, whether actively or in softer forms, must be understood as the convergence of a technology that depends upon sharing to grow and a middle class milieu in which community building is an established moral project.

**Spectrum of FOSS Evangelism**

The spectrum of FOSS evangelism in India includes evangelising FOSS through LUGs, to students at colleges and universities and lobbying policy makers in universities, state and central governments to adopt FOSS. Although efforts to spread FOSS via projects that aim to bridge the digital divide can also be included under the FOSS evangelism umbrella, these efforts will be discussed in Chapter Four. FOSS evangelism in India runs the gamut from implicitly to explicitly politically affiliated. FOSS evangelism that is explicitly tied to a political project or party often merges into activism, which can lead to schisms within the wider community. While individual evangelists may differ in their interpretations of the ethical project of FOSS, they are all in agreement that there is an ethical project inherent to FOSS and that it has specific applications for India. Below I will outline the ways in which FOSS evangelism is carried out in LUGs, student talks, and lobbying.

**Linux User Groups**

As discussed in Chapter Two, Linux User Groups are an integral part of the Indian FOSS community. During my fieldwork I attended Linux User Groups on a monthly basis. My “home” LUG was the Indian Linux Users Group Chennai, or ILUGC, which meets on a monthly basis in classroom 1 of the Aerospace Engineering Department at IIT Madras. The meetings are always held on a Saturday and start at 3pm and end by 5-5:30pm. There are three to four speakers each of whom spends between 15-45 minutes giving a talk and demonstration on a particular FOSS application or issue. Examples of talks I attended include: “How e-passports work,” “How to create fonts that will convert to .pdf in Tamil,” “An introduction to the salient features of GNU Calc for GNU Emacs,” and “Introduction to Apache Kafka.” After each talk there is some time set aside for questions and discussion. There are usually between 15-30 participants who are evenly split between professionals and students with varying levels of Linux involvement. Some are very active, some are just curious, the rest fall in the middle and may have come to see a specific talk or speaker. Rarely are there more than three women present at any of these meetings (the significance of these meetings as a predominantly male space will be discussed in detail in
Chapter Five). After the talks everyone goes around the room and shares their name and their interest in Linux and this is followed by any announcements for up-coming events and general discussion. The ILUGC has a core group of three to five men who organise and take turns running the monthly meetings.

In addition to sharing knowledge and advice about Linux, LUGs offer a space and platform for teaching the right way to be a member of the FOSS community. An example of this sort of cultural transmission occurred at an ILUGC meeting in September 2016. This meeting had at least ten students from a local engineering college in attendance and was used as an opportunity for some students to give presentations. While a student was setting up his presentation he was scolded by Sam, one of the core ILUGC organisers. It became apparent when he plugged his laptop into the AV system that he was using proprietary software. Sam told him in front of everyone that he was not allowed to use unfree technology at these meetings. The student then borrowed another attendee's computer and loaded his presentation. When he began the presentation it was quite clear he was nervous; there were several pauses and repeats as he spoke. Sam stopped him and advised the student "not to worry so much" about being formal, to just share what he wants to share with everyone and to speak in Tamil if he wanted. The student switched to Tamil and seemed a lot more comfortable; his posture improved and at times his tone was very animated. After the presentations another ILUGC organiser gave a short talk addressing the students at the meeting. He told them that he wanted them to come to these meetings regularly, not just when a friend presents. He also told them that they need to study and understand the philosophy behind FOSS rather than just appreciating that it is free of cost and has some technical advantages. Weeks later I asked Sam about the encounter and he told me that it was part of his duty to ensure the students understand that only free software is to be used at the meetings.

Although the ILUGC organisers are generally seen as an embodiment of the FOSS community, their ethical status is not immune to critique. At a meeting in August 2016 I sat next to some students who study at a nearby engineering college. During a break between talks we chatted about where they were from and what they studied; they were all computer science students. After the second talk the young man seated behind me started debating with his friend whether or not to ask a question. I turned around and asked why he was unsure about asking the question
and he told me he was conflicted because the subject of the talk – the technical explanation of how websites like Facebook and LinkedIn get and share user browsing data to use for their own needs or to sell to advertisers – goes against his understanding of FOSS philosophy on privacy and surveillance. He wanted to know the presenter’s thoughts on the social implications of these technologies but he also didn’t want to be thought of as rude, especially since this was his first time at this meet-up. He decided to bring it up in the informal discussions after the meeting, though he did not and I never saw him again at ILUGC meetings.

These meetings are spaces where new Linux users are introduced to new technologies within a community with established norms. They are also spaces where these norms can be, but are not often, questioned. After spending a year attending ILUGC meetings it was clear that the organisers sincerely care about nurturing the growth of computer science students. In theory, they are welcoming of questions about what it means to be a member of the FOSS community. In practice, however, the men who organise ILUGC are established professionals and their status as such can inhibit questions from students. Further, the ILUGC was not a space where overtly political ties were made between FOSS and wider socio-economic issues. Although several of the men who organise the ILUGC meetings are also active in explicitly political FOSS groups such as the Free Software Foundation of Tamil Nadu (FSFTN), the ILUGC is purposely “apolitical.” This apolitical stance is reflected in the group’s decision to call themselves a LUG rather than a GLUG (GNU/Linux User Group). GLUG is a signifier that the group is explicitly affiliated with free software rather than open source and is easy to spot for any active member of the Indian FOSS community. In fact, the ILUGC’s insistence on remaining a LUG cost them a visit from Richard Stallman several years back. The decision to maintain LUG status is consciously calculated in an effort to create a space where Linux enthusiasts from any technical or political persuasion are welcome. The implications of this stance within the wider Indian FOSS community will be discussed in more detail later in this chapter.

**University Talks/Training**

College and university campuses are perhaps the most common targets for Indian FOSS evangelists. I was told time and again that the Indian education system, because it is based on rote learning, needs reform. One long-time FOSS activist told me most computer science students graduate without having ever written any code. He compared it to expecting English majors to write novels when they didn’t have to read them in college, adding “Our universities
“are] churning out computer operators rather than computer scientists.” The argument given to me was that the Indian education system produces people with a crucial deficit in critical thinking. It was further argued that critical thinking must be taught to students if the education system is to produce the kind of workers needed to take India beyond providing software services via outsourcing to a nation that provides software innovations. By design, FOSS involves a level of creativity and critical engagement with the programming process that precludes rote learning and therefore FOSS evangelists saw campus talks and workshops as a much needed educational intervention. Further, FOSS philosophy emphasizes critical engagement beyond technology. Consequently, evangelising FOSS to university and college students was seen as an ideal way to produce the kinds of technical and social innovators the nation needs.

To reach this pool of potential converts a FOSS group will apply to give a talk on a FOSS technology on, for example, a currently popular language such as Python. The university or college will enthusiastically accept this offer of free training, especially since most FOSS evangelists are usually employed as professional IT workers and often attended prestigious universities. In the case of more rigorous programs such as multi-day training camps, the sponsoring group will approach a campus for space to rent and then invite student participants to pay a modest fee to attend. Most students who come to a talk or workshop will do so not because they are especially curious about FOSS but to receive a much coveted certificate of completion which can be added to their CV. During the session the speaker will try their best to instil not only the technical merits of FOSS but will also explain its philosophy. Depending on who is sponsoring the talk it could also include explicitly political content about current government policies that relate to IT or civil liberties. However, proselytising FOSS to students can also be interpreted as apolitical, and indeed some technically engaged evangelists (discussed later in the chapter) would say it is. On the more explicitly political end of the spectrum are the FOSS organisations affiliated with the CPI-M. I will now describe an event put on by a politically active FOSS group, the Summer Training Camp put on by the Free Software Foundation of Tamil Nadu (FSFTN) in August 2016.

I was invited to attend the third and final day of an intensive training camp aimed at undergraduate computer science students. I arrived at Loyola College in central Chennai on
Sunday morning at 9:30am but the first session had not started yet because the power kept going out. When the generator finally came on the first presenter of the day, Giri, a young software engineer who had travelled from Bangalore to be there, started the session. He began in English but then switched back and forth to Tamil for the benefit of the students who were more comfortable in their native tongue. The presentation was titled “Crypto Party” and was an introduction to creating cyphers to increase data security. Giri emphasised that all “hacking” is good and constructive but that using these tools for illegal or destructive purposes is called “cracking.” He asked the audience to raise their hands if they ever felt they needed privacy from their parents – all did. Laughing, he asked what their parents say if they request privacy and several versions of “what's wrong, let me help!” were given from the students imitating their parents, to more laughter. He then used the example of bathing every day: “You go into the bathroom wet yourself, use some kind of cleaning agent, wash, and then rinse. Everyone knows what you do but it is private and that should be respected.” He said it is the same with your emails and browsing; even if you are not doing anything wrong, it is your right not to be spied on. He gave advice on email and browsing services to use as well as how to create and store powerful passwords. Then there was a hands on exercise where he showed the students how to create a cypher in Python. About every one in three students had a personal laptop to use for the hands-on practice and the students sitting around them would watch and help. As the session came to an end Giri urged the students watch the documentary “The Internet's Own Boy” and the television series Mr. Robot. Giri’s final advice was that the best encryption is the real world, i.e. sharing sensitive information in person is always safer than sharing it online.

Throughout the day I observed three additional sessions on Mesh Networks, Privacy and Surveillance, and Torrent. Each presentation followed a similar formula: the presenter would discuss and demonstrate the technology, explain how the technology is related to political or corporate use or misuse and, finally, provide a hands-on exercise for the students to engage with the technology. Examples of ethical uses included how Mesh Networks were used during the

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22 The Internet’s Own Boy is a 2014 documentary about the life and death of Aaron Swartz, an American programmer and activist who was passionate about using the internet for sharing information. In 2011 he was arrested for illegally downloading thousands of academic articles from JSTOR. His theft from JSTOR using MIT networks was prosecuted as a felony crime with a maximum penalty of one million dollars in fines and up to 35 years in prison. He refused to take a plea deal and committed suicide rather than face these charges.

23 Mr. Robot is an American television series about a computer programmer who joins a collective loosely based on anonymous and uses his technical skills to destroy consumer debt records and take down a hegemonic “evil” corporation, “E Corp.”
Arab Spring and misuses of technology included how social networking sites use and sell your personal data (the sentence “If the service is free, you are the product” was projected against the wall). During the session on Privacy and Surveillance the presenter highlighted the work FSFTN and others did to fight Facebook’s Free Basics’ attempt to end net neutrality in India (discussed in Chapters One and Seven). American popular culture references including The Internet’s Own Boy and Mr. Robot were brought up by each presenter. The hands-on activity during the session on Torrent was for the students to all download a copy of The Internet’s Own Boy using Torrent.

Unlike what I observed in LUG meetings, the students at the training camp were relatively comfortable asking questions and voicing doubts. For example, during the session on Mesh Networks, one student asked if this sort of technology would enable terrorists. Giri answered the question with an example. He asked: “If I were to give you a knife and an apple and then put you in a room with another person, you could use the knife to kill the other person or to cut the apple, if you used the knife to kill was it the knife’s fault?” He concluded that it is the person not the tool that is to blame. Similar interactions occurred throughout the day. The fact that these students were willing to ask questions and even disagree with the presenters was exactly what the presenters wanted. However I was told later by the volunteers that this level of engagement was hard won over the three day training.

As the last session was coming to an end, a slide-show was put up and the students were asked to repeat out loud what was put on the screen: “I WILL USE FREE SOFTWARE” and “I WILL CONTRIBUTE TO FREE SOFTWARE.” After the collective shouting in support of free software, a young female volunteer wearing jeans and a long FSFTN t-shirt took the stage and spoke about volunteering with the FSFTN. She shared that she too had been at a summer camp like this several years ago and since then has been an active volunteer. She suggested that they form GLUGs on their campuses and get involved with regional meet ups. She also encouraged them to work to change government policies that hamper free software, giving net neutrality and IT ACT 66A\textsuperscript{24} as examples.

This summer camp, which had well over a hundred students from local engineering colleges and universities, was run by about 30 volunteers. This was the third such camp put on that year by

\textsuperscript{24} Discussed in Chapter Two, the IT ACT 66a was used to prosecute people who were critical of the government, for example on social media.
the FSFTN. The volunteers were mostly IT professionals in their twenties with full time jobs who received no remuneration for the many hours needed to organise and run the camp. Several told me their day jobs are just to pay the bills so they can pursue their passion for free software and free software outreach and activism. During lunch I sat with a group of about six volunteers and talked to them about why I was there and what they were doing. They explained that “up north” (northern India) FOSS groups would hold conferences and institutions would pay participants to attend but that in southern India they had to hold these trainings and charge the students to attend to cover costs and fund the organisation and its outreach projects. At the end of their three-day training each student would get a certificate of completion, a Linux CD and a T-shirt. The volunteers told me that in India most computer science students are told to major in the field by their parents who hope this will lead to a lucrative career. Once a student embarks on the computer science pathway they have no choice in what coursework they take; all students take all the same classes. The volunteers emphasised that if students do not get exposure to FOSS in school they need to discover it on their own or from camps like this. The volunteers said it is very challenging to teach the FOSS philosophy because most of the students just do not “get it” and do not believe that privacy is a right, especially if they feel they are not doing anything wrong.

**Lobbying: Mobilising Status in the Name of FOSS**

Lobbying is an attempt at large-scale conversion. Lobbying policy makers, whether a school’s administration or ministers in the state or central government, is evangelism aimed at powerful individuals in the effort to improve India’s infrastructure, whether it be educational or otherwise. This kind of evangelism can only be practised by those with suitable status which gives the evangelist access to powerful decision makers and a compelling reason to be listened to. For example, one retired professor explained that by using a combination of his PhD from a prestigious university and his “grey hair” in addition to his most recent post as the head of an institute he is able to make policy makers meet with him whether they want to or not. He added that because of the networks he has from his alma mater he is very well connected and can “drop names very comfortably.” That he is a Brahmin from an upper middle class family and conveyed considerable personal charm surely added to his arsenal when it came to convincing state level bureaucrats to meet with him. When such status is used adroitly, large impacts are possible.
Below I will detail examples of how status can be mobilised in an effort to promote large-scale FOSS adoption in India.

Spoken Tutorial\textsuperscript{25} is a project funded by the Ministry of Human Resources and Development and run out of IIT Bombay. It is headed by a charismatic chemical engineering professor who wants to harness FOSS to improve Indian education. He has been able to secure substantial funding for this project and other projects; I was told he was “well connected” and it certainly seemed so though his organisational zeal and skills were also obviously part of the success of this and other projects he was working on. The project creates and then distributes online tutorials with spoken accompaniment in 17 Indian languages, with plans to eventually incorporate all 22 recognised languages. These tutorials cover a variety of topics ranging from basic computer literacy and how to use word processing documents to learning to code in several FOSS languages. The tutorials are distributed to colleges and universities across the country which serve less privileged students. The eventual goal of the project is to ensure that 10% of all college students in each state and union territory take a semester long course based on these tutorials. To accomplish these goals the project has a large staff which includes software developers, education specialists, and a marketing team that employs at least one person tasked to lobby relevant bureaucrats in each of India’s 29 states and seven union territories.

During my visit to the IIT Bombay campus I met with the marketing team, who share a building with the content creation team. The woman who runs the marketing team is both commanding and charismatic. She told me that they use \textit{The Art of War}\textsuperscript{26} to guide their marketing strategy, adding that the best war is one where you avoid spilling blood. She said they do this by employing tailored diplomacy to the politicians, educators and bureaucrats necessary to implement the Spoken Tutorial project in each state. This includes researching their needs and educating them on the merits of FOSS. She also shared an example of a time when she was tough (“spilled blood”) with a state minister who kept telling her the program was no good. She stood up in the meeting and said “Fine, then we will pull out all our resources,” at which point he acquiesced. Her threat was meaningful because, in addition to the Spoken Tutorial coursework, the project provides the participating schools with technological and academic resources, with the caveat that in addition to incorporating Spoken Tutorial into their curricula they also switched

\textsuperscript{25} \texttt{http://spoken-tutorial.org/} accessed 31/3/2018.
\textsuperscript{26} \textit{The Art of War} is an ancient Chinese military treatise written by Sun Tzu.
to FOSS technologies. These tactics, in addition to the prestige of working with IIT Bombay, have introduced FOSS to millions of Indian students. According to their own statistics, the Spoken Word project has deployed nearly 90 thousand training sessions to over four thousand schools, reaching over four million students across India.  

Another example of evangelism through lobbying is that of Anand, a professor in Bangalore who has been working to spread FOSS in India for over a decade. He discovered Linux in the 1990s when he was pursuing his PhD at an American university. In 2002 he returned to India to teach at a prestigious business school. He was studying ICT for development and the IT@school project in Kerala was an obvious place to start. From that experience he collaborated with the activists and government of Kerala and helped found ICFOSS in Trivandrum, the state capital. He was involved with the national FOSS scene as a researcher and observer for many years and then in 2010 he became an activist. When asked what being an activist meant to him he said “For me, it’s more or less pushing policy in government. Because... we are a premier institute the government listens to us. I get pulled into all sorts of committees... and I will push open source everywhere.” He also uses his position to influence government employees who come to his university for mandatory mid-career training. He coordinates these efforts with other professors from elite universities and he was part of the group that convinced the central government to adhere to a pro FOSS policy in 2015.

Anand’s efforts to “push policy” are rooted in his research, which in turn is rooted in his ethical stance towards India’s socio-economic growth. When asked if he thought FOSS in India was different than in the US or elsewhere he was one of the few people who immediately answered yes. In addition to the fact that India consumes more FOSS than it creates he said there is a “strong” cost implication as well and that “free as in beer counts.” He explained that Stallman doesn’t like it when he says this but that cost matters in India. In 2009 he published a report on the economic impact of switching 50% of Indian computers to open source and found that the Indian economy would save 10 thousand crores,  

Who’s keeping Bill Gates happy? I mean happy and the wealthiest man on the planet? All of us are contributing to it. And I had done a study of 20 organisations in which I concluded that most of them actually really don’t need Windows and Office. They need

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28. 1 crore = 10 million rupees, which is equal to approximately £112,000.00.
a few features all of which is available in Open Office. Simple substitution economics. Here’s a good, substitute it with a cheaper good. This cost 10,000 rupees, this cost zero. In addition to economic arguments he feels there is a public good argument that free software is most appropriate for government funded projects. This way government and citizens have access to technologies and such technologies can be shared with other developing nations. He feels that there is an intrinsic culture of sharing when you create and use free software that is of use to all nations but especially for developing nations.

Efforts such as these led by elite academics have made some significant impacts on how FOSS is perceived and used in policy making circles. Of course for all the work done by professors at elite universities to lobby policy makers in the name of FOSS and national good, there are many more lobbyists who are paid by proprietary companies. Anand told me that proprietary vendors often give kickbacks to politicians and so the fight for free software is also a fight against corruption.

**Ideological Purity and Practice**

This chapter has outlined how many in the Indian FOSS community use evangelism in efforts to ameliorate the nation’s education system and further development goals. To appreciate how the ethical project of Indian FOSS has evolved we have to understand how it fits into the ethics of FOSS broadly. As discussed in the Introduction, one of the key features of the global FOSS community is that it is deeply rooted in ethical concerns that include and extend from how software is created. According to Western FOSS enthusiasts, the “Hacker Ethic,” is an attitude towards work, specifically software programming, which entails finding intrinsic joy and fulfilment in using computers to create via programming (Himanen: 2002: 3). The four freedoms that define free software, the freedom to use, study, distribute and modify source code, enhance the self-defined hacker ethic and also encompass additional technical and ethical precepts. It must be noted here that these freedoms are not interpreted similarly by software engineers. Although most software engineers would (now) agree that source code should be made available to use, study, distribute, and modify as needed, those who use the term open source are most concerned with how these freedoms produce technically superior software. Those who use the term free software are most concerned with a distinct ethical commitment to freedom above and beyond pragmatic concerns. This conception of freedom is rooted in liberalism and prioritises free speech and meritocracy (Coleman 2012). In this section I discuss how this split within the
global FOSS community is interpreted and implemented in India by exploring socially and technically engaged evangelism as well as how purity in the FOSS community is constructed and contested.

**Socially Engaged Versus Technically Engaged Evangelism**
In his ethnography of evangelical Christians in the American South, Elisha developed the term “socially engaged evangelicals” to describe those who “...draw strong associations between religiosity and social conscience and are notably active (either professionally or as volunteers) in promoting and participating in various forms of organised benevolence” (2011: 7-8). To discuss how the divide between free software and open source software evangelism works in India, I find that socially engaged evangelism is a useful term for discussing free software evangelism but that I must add technically engaged evangelism to account for open source evangelism. To be sure, these groups have more in common than not, but where they do differ provides insight into the ways in which Indian FOSS evangelism shows fissures within the Indian FOSS community. To explore some of these differing orientations I will discuss paid evangelism and why some Linux User Groups are called GLUGs rather than LUGs.

**Paid Evangelism**
As this chapter has shown, evangelism is an important way for members of the Indian FOSS community to share their love of this technology in ways that also benefit local communities, particularly students. However, among socially engaged evangelists who identify as free software activists, not all evangelism or evangelists are morally equal. For Kumar, who runs a free software organisation in Kerala, technically engaged evangelism is not sufficient. While discussing some FOSS activists who are paid by Mozilla to give talks and organise events, he said that when he has coordinated with them he realised “they have zero conviction on anything; they’re paid, they are doing a job. That will not create a community. So as long as Mozilla is able to fund it will exist.” For Kumar, and other socially engaged FOSS evangelists, funding to carry out projects is seen as necessary but not sufficient. For them, true evangelism is based on true conversion, which is not dependent upon material circumstances. Hence, these evangelists will often criticize well-funded projects if they do not meet their moral criteria.

Some criticisms of well-funded FOSS evangelism projects are based on pragmatic concerns. Despite its ambition and reach, the Spoken Tutorial project discussed earlier is criticised by
many in the Indian FOSS community. The criticisms are based on the grounds that the project is using valuable resources to “reinvent the wheel” in terms of producing tutorials which already exist in countless forums online. Further, several people pointed out that the scale of the project was not sustainable because it only had funding for the next year or so. Finally, perhaps the most damning criticism was that the man running the project was not ideologically sound. More than one person told me that he was more an open source than a free software advocate. Indeed, this insult of being “more about open source” was given to me as an obvious dismissal of any person or project that was not philosophically, politically, or socially engaged as the critic thought they should be.

For Dev, having government mandated or funded projects at all was inherently problematic:

Free software is not just about technology any more, right? It extends to many more things... the critical point being having the freedom to do something. ...And you can’t legislate something like this – I mean you can and at some level you should, but, can you see the problem is this, it all comes down to the why. Why are you adopting free software, you know? If your reasons are forced and this and that then the next time someone replaces the decision maker the whole thing is gonna change... so unless... the basis was clear and widely understood and respected you would have people who keep ...using free software in various forms and starting something good and then losing it...those ups and downs are only going defeat the whole cause of free software... that’s the danger of politicizing something like [that] but if something can come out of it why not?

Dev’s argument that mandated change cannot be counted upon because it is not rooted in deep conversion to the free software philosophy is fair. However, there were many in the Indian FOSS community who took a more pragmatic approach.

The pragmatic approach was more readily embraced by those I would characterise as technically engaged evangelists. Dinesh, who describes himself as an open source evangelist, has been involved with open source since 1997. Since his conversion he has worked to bring Linux based computers to villages and schools. In 1999 he co-founded an NGO which was localizing a user interface to Hindi. Since then he has worked for Red Hat India among other corporations and NGOs to promote Linux in Indian government and industry. He is passionate about harnessing FOSS for what he termed “digital independence.” He sees the integration of open source software into the nation’s infrastructure as necessary for national autonomy, explaining “having open source gives you that kind of control.”
This pragmatic approach was even more pronounced by Hari, who runs a FOSS start-up in Mumbai. When discussing his limited interactions with government funded projects, he said:

They just end up being self-serving projects... there was really no energy in these people who ran these organisations, they weren’t visionary... they weren’t connecting with people in the local community... [compared to American academic open source] the IITs are completely missing in action... There is no impact. These projects are not accountable to industry.

Importantly, although Hari’s critique of large-scale government projects is similar to that of socially engaged evangelists, his critique is coming from a technically engaged perspective. As one of the few people who was almost exclusively involved with FOSS from an industry perspective, his positionality to the Indian FOSS community has to be understood as such. He feels like the academics and the activists are elitist and neither address issues he finds important, such as nurturing Indian FOSS businesses. Further, he finds the free software versus open source debate a waste of effort that could be better spent:

In 2016 open source has won. ...So the free software argument doesn’t really hold true anymore because if you’re not open source nobody will look at your software. ...the free software philosophy, that naturally won out. ...You know the free software guys... I haven’t seen them do anything. They may have done some events, they may have gone to some colleges and talked about free software and everything but have they actually done something, probably no.

When Hari says the free software philosophy “naturally won out” he means that this way of creating software has been proven superior, so there is no more need to quibble about titles. Hari’s critique of “the free software guys” is based on the “show me the code” mantra that is common in many FOSS circles. Although Hari participates in community outreach and volunteers to speak at schools, he is far more concerned with technical contribution as the measure of FOSS in India than any philosophical or social benefits associated with much of Indian FOSS evangelism.

**LUGS v GLUGS**

The nomenclature of Linux User Groups is another space where the Indian FOSS community fissures. GLUGs are what free software activists attend whereas LUGs position themselves as apolitical. Of course not choosing a side is still a choice and one with consequences. About ten

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29 “Talk is cheap. Show me the code,” was infamously sent out by Linux creator Linus Torvolds to the Linux kernel mailing list in 2000 and is representative of the rhetoric of technically engaged members of the FOSS community.
years ago Richard Stallman came to Chennai and refused to visit one of the country’s oldest LUGs, the ILUGC, because they were not a GNU/Linux User Group. Why be a LUG when you can be GLUG? One answer, and the one the ILUGC seems to give, is that by not signalling affiliation with any particular sub-genre of the FOSS community they are providing a space where true debate is possible and are better positioned to reach a greater number of potential converts.

For socially engaged FOSS evangelists the technology is important, but it is a tool to be used in explicitly social or political ways. Discussing his involvement with LUGs in the 1990s Kumar said they did a lot of community building work but he feels most LUGs today are too focussed on technology:

Free software was driven by a kind of philosophical and political enthusiasm at one point in time. Now we have these hardcore pragmatists who have no other reason other than the learning technology and in most cases the career advancement through technology... it’s a rather very private, selfish interest. That doesn’t require a collective action. it’s a very, very private process. And the mainstream of free software or FOSS, not free software, FOSS is the right term to use in that context – the mainstream of the FOSS is now replaced by these people with these kind of private concerns and that doesn’t require a centralized institutional arrangement. And they will not even contribute to... a collective action agenda.

Because user groups are where a lot of people become fully immersed within the wider community, the type of engagement the group is focussed on – social or technological – has implications for how the wider community will grow and what it will prioritize. To be clear, both LUGs and GLUGs operate almost entirely the same way and discuss the same issues. LUGs do sometimes participate in wider social issues and GLUGs are not averse to members trying to advance their careers. However, these names are important because they connote the denomination of the group’s members and their general orientation towards what technology should mean and be used for.

**Ideological Purity and Practice**

After a large breakfast of filter coffee and dosa, at 9:30 Giri and I took an Uber through Bangalore’s congested traffic to the FSMK office for the monthly meeting. While we were in the Uber Giri shared how hard it is to be “pure” as a free software activist. He maintains a Facebook account even though that is somewhat controversial within the free software community. I was a little surprised. He was at the FOSS training camp I attended where all the students were told to
switch from non-free social media platforms such as Facebook to FOSS alternatives such as Diaspora. Just that day Giri had been having an email exchange with a recent convert who was shocked that he had a Facebook account. Giri explained that newer converts are usually more concerned with “purity” but that to reach more people it is important to have a presence in mainstream technology, too; i.e. they needed to preach to those who are not yet in the choir.

This confession is telling. Giri is a hard-core free software activist who ties his work with free software to left-wing political beliefs. But not only does he both maintain Facebook and Twitter accounts, so too does the FSMK and every other free software group in India. Even they find it difficult to practice what they preach. Their argument is that although it is distasteful to participate in un-free technologies, it is necessary to stay connected to and part of the wider communities who meet on these platforms. As the following discussion will make clear, maintaining strict ideological purity within the FOSS community can be a challenge depending on where you fall in the FOSS continuum between free software, open source, and every permutation therein.

On the pure end of the spectrum is Dev, who has moulded his life around free software. He runs his own free software based start-up, he only uses hardware he can hack, and he spends much of his free time evangelising. When I asked how his commitment to free software has affected his life he said he that although he has been able to live the Indian dream by owning a successful business and starting a family that, at the same time, his commitment to free software has also been very difficult:

It’s not socially acceptable to be so strict about your beliefs. ...It’s always been an uphill battle for me. And I wouldn’t blame my business or free software for it but personal life has been very turbulent. Partly because I have stuck to what I do and I have not chosen to do something else... partly because I value certain types of idealism a lot more than others do and again that creates a problem... in your personal life. So it’s a struggle that I don’t know how to win or balance well enough. And without going into too many details it’s been very tough to remain committed and to still present a, you know, a successful – as defined by society or family – a successful enough face at home.

Dev’s strict adherence to the ideals of free software are extreme. They preclude many options and thus restrict his family in some ways as well. He only gives his child toys that can be taken apart and understood. He will never likely become rich from his IT start up, though it is not for lack of skill or ambition. His ambitions are not for material gain however, they are moral.
Although I met no one as strict as Dev, I did meet many free software activists who imbue software, or its potential to shape society, with deep meaning. For Nitesh, this was in fact worrisome. He is concerned about the nexus between free software enthusiasts in India and the surveillance state. While trying to figure why so many Indian FOSS enthusiasts are not very critical of surveillance he mused:

Unlike in other parts of the world we might have a greater degree of technical utopians in the free software community in India. ...our educational system extinguishes the critical capability in young people. So once that is extinguished young people keep moving in search of anchors and absolute truths and to the young atheist free software developer technology becomes the religion and then they hold onto certain articles of faith such as new technology is better than old technology, complex technology is better than simple technology, expensive technology is better than cheap technology and technology is neutral and all these kind of things... Stallman used to use this example about [how even] if you use free software to build a prison it’s still… a prison, it doesn’t make it a better prison. ...because there is a lack of opportunity to discuss politics in terms of ideology as distinct from personality. In India all the discussion is [about personality]... so my feeling is that because of the lack of a critical capacity, because of lack of exposure of the history of political ideology Indian IT professionals and free software developers are much more naive and tend to embrace technological utopianism a lot more easily and the price for that is that they somehow think that surveillance state is a good idea.

This discussion was about the implementation of Aadhaar, an all-encompassing biometric which links bio data with address, bank account, and more. The surveillance state as a specific concept was not an issue that came up often in discussion with my informants, though the implementation of Aadhaar was brought up by those who were socially engaged evangelists as problematic. However, a few of the more technically engaged people I met did discuss technological progress generally as beneficial and one person discussed Aadhaar specifically as progressive. Though the wedding of technology to religion has always existed, technology as religion is a more recent phenomenon (Noble 2013).

More common than discussing technology as religion was discussion of how FOSS fits well within traditional Indian thought and religion. Many people told me that FOSS makes sense for India not only because the four freedoms have practical advantages when it comes to engineering education and industry, but also because these freedoms themselves are inherently Indian. It was practising Hindus who would make this argument. For Sita, an assistant professor at a prestigious university in Chennai, discovering FOSS was a natural extension to her interest in Indian philosophy. She completed a PhD that combined her interest in Indian philosophy with FOSS.
When I asked her how that combination worked she replied that Indian philosophy is about freedom of thought, adding the thought process “should not be bound... So it is that kind of aspect that I could relate directly to the four freedoms that FOSS is talking about.”

On the pragmatic end of the spectrum, some view FOSS in India as the best technology for the least price, or what Prakash, who heads an NGO, called “the fifth freedom”:

> There is the issue of the fifth freedom in India, which is the price... There are a bunch of people who are very, very steadfast to the concept of free software where freedom is all that matters, nothing else matters. ...I mean Stallman’s followers, people who are kind of radically moved by him to the extent that they will forgo all other conveniences and stick to – there are some real sacrifices you have to make if you want to follow that path. ...But there is a bunch of people also... who are not at all bothered about this except the fact it’s free. But in the middle we have a bunch of people who have taken a nuanced position balancing these multiple... sometimes conflicting kind of pools by understanding and considering the need for freedom of software.

Most people fall somewhere in the middle between ascetic adherence to Dev’s insistence that all technology be free and an entirely pragmatic approach that uses whatever is most convenient. For Rav, age and experience has mellowed his approach to both technology and religion. In addition to being very religious in his youth, he said he was also very “hard line” about Linux when he was younger because he was in an academic bubble and did not even understand the proprietary or commercial side of things. Now he has worked in industry and is much more open to partially free software licences because he knows they can help smaller businesses. When asked if he ever got push-back from the FOSS community for his somewhat lax position on FOSS orthodoxy he said “no” because he “keep[s] my personal views to myself,” adding that because he already has a reputation in the community that even if he meets FOSS hard-liners they do not question him because “In India… if you are regarded as somebody big… everybody says ‘alright, fine.’” Then he explained that he respects some hard-liners, although he does not agree with everything Stallman says – for example he does not think people should pirate music because it is breaking the law – he respects that even when Stallman buys hardware he ensures it is open, he is self-consistent. For Rav, principles are important; FOSS just is not his top principle any more.

No matter where they sit on the FOSS spectrum, everyone I spoke to expressed respect for Richard Stallman. Although, with the exception of Dev, no one felt compelled or capable of
being as hard-line or pure, everyone appreciated that Stallman was out there defining the standards. As Prakash told me when explaining his use of “middle of the road” pragmatism:

Stallman of course is Stallman and you need somebody like him to make those positions, otherwise the whole equilibrium will get shifted. We need Stallman just to keep up the whole balance but to be him is not very practical for individuals or for the government. ...Here we are bit more well, not very sharply focused on freedom; freedom is very important to many of us, we understand it very well, but especially when it comes to the government there are limitations... So the free software people are always kind of lobbying from outside saying that we must control the free software but it doesn't really work.

Negotiating when and what to compromise can be tricky though. Although Kumar sees free software as very political he does not want to be affiliated with any political party because the parties are involved in the electoral political game and he is more concerned about people being critical thinkers about the political world than what an actual political party is saying. He gave as an example that there is a faction of the BJP that strongly supports free software as part of their swadeshi agenda but even they are not able to do much lobbying with the national BJP government because the government is tied up with business interests. Despite corruption and business ties, Kumar feels there has been a lot of growth in pro FOSS policy and implementation. However, these successes and the success of the technology globally “means nothing” because he cares about community and politics. He reiterated that the new user groups do serve a social purpose in that people learn from each other and have a certain sense of community but he added, “The difficult thing is to bring the politics back and I am concerned only about it because that is how the freedom is protected in the longer term and the short term wars are meaningless.” However, because he refuses to partner with political parties, the work is slow going.

**Conclusion**

In many ways the Indian FOSS evangelists are very similar to the American geeks and hackers other anthropologists have written about (Coleman 2012; Kelty 2008); they are motivated to continually learn and create free software because they find the internal goods inherent to the practice intrinsically satisfying. However, added to and in some ways superseding these motivations is the FOSS evangelism discussed here. The two generations of Indian FOSS evangelists address different audiences: younger activists focus on spreading the gospel to students and the disadvantaged (digital divide) and older activists focus on evangelising via lobbying and setting up FOSS-centric infrastructure in NGOs, government, academe, and
industry. Despite having more in common than not, there are fissures within this community based on whether one’s orientation towards FOSS is more social or technical.

What these different understandings of and subsequent evangelising of FOSS demonstrate is that FOSS is not easily pinned down to a coherent, agreed upon ideology. Rather, FOSS in India is shaped by the pushing and pulling of many practitioners in personal and public domains. In the personal domain practitioners wrestle with what this practice should mean for themselves and others whom they evangelise to. In the public domain practitioners wrestle with the needs of government and corporations and if these needs can or if they even should be reconciled with the more ideological aspects of the practice, if the goal of the evangelist is to spread this technology as far as possible. These negotiations and compromises within and between the personal and public domains simultaneously reveal both the pragmatism and ideals of the Indian FOSS community.
Chapter Four – FOSS as a Social Tool: FOSS Activists and the Indian Middle Class

Introduction
The majority of Western FOSS enthusiasts are not comfortable explicitly aligning FOSS with political causes (Coleman 2004), however when Western FOSS activists do organise around a political issue their contributions are made via technology itself using what Coleman calls “weapons of the geek” (2016). What I found in India, however, is that while a substantial minority of FOSS enthusiasts do contribute code to international or Indian FOSS projects, most of the FOSS activists I met spent much of their time and energy making non-technical contributions in the name of FOSS. These activities are most often evangelism and lobbying discussed in Chapter Three. In this chapter I will focus on the ways Indian FOSS activists contribute to community development projects and, in the process, nation building. I will also interrogate whether these activities can be considered a social movement.

Kelty claims that although FOSS may be a movement it is not a social movement because it is defined by practices first and ideologies second (2008:113). What the previous chapters have made clear, however, is that many in the Indian FOSS community view FOSS ideologies as complimentary to certain kinds of community and nation building which are well established. Thus, this technical practice is incorporated into a pre-existing ideology. Because FOSS ideology is mobilised these ways, for the socially engaged members of the Indian FOSS community FOSS ideology is valued as much as if not more than technical practices. In this chapter I argue that this is because FOSS fits so well with traditional Indian middle-class values. Although Kelty does not discuss socio-economic class as a salient feature of Western FOSS practitioners’ moral and ethical world-views I believe through showing how the Indian middle class has emerged and grown in the past century the different approaches to FOSS in India and the West can be better understood.

Below I will describe a project that exemplifies how FOSS is mobilised in social rather than technical work. I will then trace the growth and diversity of the Indian middle classes and class and caste consciousness amongst FOSS activists. Next I will discuss the implications of FOSS in India with regard to social movements. Finally, I will discuss how the activist’s commitment to using FOSS for community development is related to their choice to stay in India rather than live
and work abroad and how this choice is informed not only by emerging opportunities within India but the desire for a specific quality of life which includes a commitment to improving quality of life for fellow citizens.

A FOSS Project that has little to do with FOSS
On a Saturday afternoon in October 2016 I stood outside an IBM office building in southern Bangalore to meet with the Free Software Movement of Karnataka (FSMK) activists I had been emailing with for over a month. Because I was based in Chennai and would be making a special trip to meet them they planned an entire weekend to show me the work they do. Although they have an office, they wanted me to see the community centre they run in a slum first. After a few SMS messages and calls, my contact Giri located and directed me across the street to where his two-wheeler was. I recognised him as one of the presenters I had met at the Free Software of Tamil Nadu boot-camp in Chennai a few months back, discussed in Chapter Three. After we got reacquainted I got on the back of the scooter and we manoeuvred through narrow streets to the lane that houses the Ambedkar Community Computing Centre. We were met by a young man of 16 who lives in the community and helps run the centre. He led us down an extra narrow lane to the building and up a dark stairwell to the second story where a large open room houses the community centre.

As we entered the room there was a large window on the right-hand side which looks down on the lane and to the left there was a table that holds two or three large old style monitors and PC towers. Towards the rear of the left wall was a large chalkboard and under the chalkboard an old sofa (when I sat down on it later in the evening the students told me to get off because there are bedbugs but the students would all pile on from time to time). There were some folding chairs towards the back of the room and a few chairs against the right side wall. Everything in the room was old and worn down but the walls had a fresh coat of pale blue paint, the handiwork of some of the students.

When we arrived there were about ten young people ranging from ages 10 to 23. Occasionally some would leave and others would arrive. I was at first invited to sit in a chair but then Rohit, the other FSMK activist, asked if I would be OK sitting on the floor, which is the custom. We all sat in a circle and Giri sat next to me to interpret as most of the students do not speak English
very well. Although they live in Karnataka they are Tamil speakers, part of a Dalit\textsuperscript{30} community that migrated to Bangalore from Tamil Nadu. Everyone said their name and age and they asked some questions about why I was there.\textsuperscript{31} Most of the young adults who participate in the centre are in school. There are also a few people who are out of school but still come to the centre on a regular basis to volunteer and/or continue taking classes. One young woman in her early 20s works at a medical clinic and cited the confidence and public speaking skills she learned at the centre for helping her to work with the public at her job. I asked some of the students what they hoped to do when they finished school. One very feisty 12 year old girl said she wanted to be a beautician and then gave a speech about how she gets beaten by her parents for coming to the centre because there are boys and girls interacting together. Later the FSMK activists told me that the centre is somewhat controversial locally. This may be, as the activists suggested, that it is seen as anti-religious.\textsuperscript{32} It may also be that parents worry about the free mixing of boys and girls and it may be that parents worry about girls in particular. However, many of the children insist on coming even in the teeth of opposition, which can include beatings (one thing to bear in mind is that corporal punishment is fairly common in India and deployed in child rearing).

Despite the disapproval of some in the community there are also some, enough, community members who support the centre and its efforts to help their children improve their educational achievements. Rohit attributes this to the long-standing relationship the activists have maintained with supportive community leaders. The centre was started in 2007 by a successful IT executive who did well working in the San Francisco area during the 1990s and wanted to give something back to India. It was then shut down for a few years due to lack of volunteers before being started up again by the FSMK. Some of the students who have come through the centre have gone on to college and professional jobs; they are the first in the community to do so. Rohit told me they are trying to train up some of the students to take over the running of the centre. This is not only to give them skills and responsibility but also to ensure that community members are

\textsuperscript{30} Dalit, meaning broken or scattered, is the term used to describe those who belong to what used to be called “untouchables.” Although the official term for former untouchables is Scheduled Castes (SC) and the term Dalit is illegal in India it is widely used, especially by those who self-identify as Dalit. In fact, this community centre is named in honour of Dr. B. R. Ambedkar, perhaps the most famous and influential Dalit. Ambedkar will be discussed in more detail later in this chapter.

\textsuperscript{31} They had also recently had another foreign visitor – a Belgian woman based in Pondicherry who is studying caste. So they were curious but not especially surprised that I would be interested in meeting them.

\textsuperscript{32} It is true that the FSMK activists I met are very liberal about religion, if religious at all. Several are vocal atheists, which is a controversial stance in India.
involved and the centre is not perceived as a project run by radical outsiders. The community itself is comprised of three narrow lanes with buildings two to three storied high built up in a ram-shackle manner. Everything feels very close in and crowded; there are roughly 200 families equaling around 4000 people total. Considering the density it is somewhat amazing that any space at all is made available for such a controversial program. Rohit does not know who owns the building but it is used as common space for the community. The Ambedkar Community Computing Centre occupies the first floor and the rooms on the ground floor are used by other groups for tuition classes. None of the groups granted access to the building pay rent.

After we talked for a while, some of the students took turns singing traditional and contemporary Tamil favourites. After the songs we talked some more and the circle broke up and the dancing started. Someone went over to the computers and turned on the music and five or six youngsters got up in formation and started dancing. Their joy and release was palpable. I got pulled onto the floor and two of the students took pains to try and teach me some choreography. Giri was also pulled onto the floor and thankfully for my self-esteem was equally inept at learning the routine. The dancing and general merriment went on for about an hour before I left with the activists and a few of the older residents from the community for dinner at a barbecue place they all love. Giri and I were the only vegetarians so we sat together and talked TV and politics.

Later that night after dinner Rohit explained that although the FSMK runs the centre and they only use free software there that they do not spend much energy teaching the kids about free software philosophy. Instead, they focus on basics such as teaching them how to use the mouse and open applications. He explained that even though they are supposed to learn these things in school the education system is “broken” and it is imperative to teach them how to use computers and fill out forms online because a lot of the educational opportunities made available to them via the reservation system are only accessible through online applications. There are volunteers who come to give them science tuitions as well as other subjects in addition to computing skills. Perhaps most importantly to the students, though, they also use their time at the centre to sing and dance – i.e. let off steam from their stressful lives. The FSMK activists encourage the singing and dancing as much as coursework.

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33 The reservation system is a scheme in which a percentage of places in (government run) colleges and universities and government departments are made available to applicants from historically disadvantaged groups.
In addition to explaining how and why they run the community centre, Rohit also told me that the students in the centre are the children of maids. He shared that growing up with maids in his home he always thought you should be nice to them. However, it was not until he had met and worked with the people in the slum that he realised they are the maids in his and other middle class peoples’ homes.

While this community centre is not the only initiative of the FSMK – they also do a lot of outreach and evangelism to students at engineering colleges and have a few technology projects going on at any given time – it does represent their significant commitment to using their mission as a technologically defined group toward social ends. The fact that the software they are using on the old PCs in the centre is free is imperative to the activists. However, the activists accept that to the students who visit the centre, the nuances of free software are almost irrelevant within the context of their need for practical help with school, exposure to the possibilities outside of their habitus, and a safe space to relax and just be kids. How and why are the activists able to downplay the very reason they exist as an activist community? To understand this we will now explore India’s middle classes and the ways in which certain sections of the Indian middle class have historically used whatever tools were available to ameliorate social problems and, in so doing, participate in a distinct form of nation building.

**Indian Middle Classes**

Before we untangle the strands of the middle class that have been woven together to produce Indian FOSS activism we must first place the contemporary middle class in its historical context. The Indian middle class has been politically significant since its inception during colonial rule. Under colonial rule the middle class was mainly comprised of a small elite of English speaking, Western-educated (in India or abroad) men employed as merchants, educators, lawyers, or civil servants in the colonial government. The majority of middle class Indians under colonial rule came from what Joshi calls the “upper strata of society” which included “upper castes Hindus or Ashraf (twice born) Muslims, and many came from families and social groups which had traditionally served in the courts of indigenous rulers and large landlords” (2011: 91). While the Indian middle class originated from the upper strata of society, colonial India was heterogeneous and so too was the upper stratum so that different groups emerged as middle class in different regions. For example, in colonial Calcutta the middle class was synonymous with the *bhadralok*, who were upper caste but not necessarily Brahmin, and defined by the importance they placed on
education and culture (Bhattacharya 2001). In Bombay, in addition to Muslims and upper caste Hindus, the Parsi merchant community also entered the middle class (Kidambi 2012: 953) while in Lucknow those whose families had served Mughal and then Nawab rulers ascended to the middle classes under colonialism (Joshi 2011: 89). Fuller and Narasimhan (2014: 65-69) show how in Madras the Tamil Brahmins, in part due to the Brahmin’s traditional role in education prior to colonialism, made the transition to professional roles and dominated the middle class in colonial south India.

Despite the diversity of the colonial Indian middle class, one thing uniting its members was a commitment to modernity. Yet, as Joshi makes clear, the modernity of the Indian middle class was “fractured” and included simultaneous endorsement of equality and hierarchy, modernization and tradition (2011: 92). These apparent contradictions were expressed in the ways the Indian middle class used the tools of modernity such as newspapers and professional associations in the public sphere to debate social reforms and, in so doing, “…were able to transform existing ideas of social conduct, cultural preferences and politics in ways that allowed them to emerge as the representatives and leaders of Indian society” (Joshi 2011: 105). Despite being in many ways shaped by the colonial government, the middle classes were not uncritical of it. Indeed, the fight for independence was helmed by members of the middle class, who were acutely aware of how politically and economically exploitative the colonial project was. There is much written about how the middle class mobilised its decidedly elite status into a pan-Indian identity which could unite a majority of colonial subjects in the nationalist movement (e.g. Torri 1991) but what is integral to understand is that, from its inception, the Indian middle class was concerned with nation building.

Post-Independence the new Indian government was largely run by members of the urban middle class, despite some efforts to increase representation by historically disadvantaged groups (Deshpande 2003:146). Between Independence and liberalization, government employment represented the best chance of maintaining or entering middle class status. Although there was some growth in the middle class via the civil service sector made possible by enhanced education opportunities, the majority of the middle class was maintained more than it was expanded. As the Nehruvian government instigated nation building with five year plans, the importance of engineers needed to literally build the nation’s industry and infrastructure became paramount and
as Deshpande notes, engineering also became the purview of the middle class (2003:144–145). The links between literal and ideological nation building were embodied by the middle class who worked for the government, sent their children to state subsidized colleges and universities, and patriotically subscribed to Gandhian renunciation for Nehruvian development.

Post liberalization, the license raj was dismantled, MNCs were allowed into the country, and there was significant growth in the middle class, and not just from upper castes. The reservation system did provide those from Scheduled Castes and Tribes (SC/ST) and Other Backward Castes (OBC) opportunities in government and education that had been traditionally inhabited by upper castes. However, just as those who had been historically excluded from the middle class were gaining a foothold on the bottom rungs, the perceived value of government employment was paling in comparison to the opportunities opening up in the growing private sector, which were accessible to those who entered based on “merit” alone. As Uphadhyya details, this is because the private sector, and especially the IT industry, were not beholden to the reservation system and the kinds of social networking and cultural capital needed to enter and succeed in the most lucrative jobs with MNCs were most easily accessed by upper castes (2011:186). In sum, while the middle class has grown it has also grown more heterogeneous and, in so doing, reproduced social inequalities.

That the middle class has expanded is certain, however, deciding who exactly fits in this expanding strata requires agreeing upon meaningful measures (income, occupation, consumption etc.) and getting accurate and representative statistics on these measures, which can be difficult. I take Sridharan’s (2011: 37) measure of non-manual workers who earn over Rs 70,000 per annum, which he accounted for in 1998-9 currency, which is equal to £1,007, as a working definition for the lowest parameter of broadest middle class status. While this income may seem quite low when converted into British pounds, the costs of living are significantly lower in India allowing for greater purchasing power than a mere conversion rate may suggest. This increased purchasing power has of course resulted in increased and changing patterns of consumption with

34 The growth of the Indian middle classes has been significant however it is important to bear in mind that even the expanded middle class of perhaps over 200 million, though large in comparison to the absolute numbers of middle class citizens in other nations still represents a relatively small percentage of the Indian population. In a nation with 1.2 billion citizens, over half of whom still live in rural poverty, the Indian middle class can fairly be characterized as elite even while recognizing that there is a very small slice of extremely wealthy super elites.

cultural, political, and environmental consequences. Indeed, the influx of Backwards and Scheduled castes into the middle class with their own patterns of consumption and forms of cultural capital has resulted in complexly layered “new middle class” in which the lower layers may be closer to the working class than they are to the upper layers of the middle class (Fernandes 2011:60).

Exploring how historical inequalities are structurally reproduced in the fluidity of the new middle class, Fernandes (2011) distinguishes between the traditional middle class inhabited by Hindu upper castes and the new middle class, which has a significantly higher percentage of lower caste Hindus as well as Muslims and other minorities. The new middle classes are both literally and figuratively buying their way into a hegemonic dominance of the Indian middle class yet, at the same time, they are fracturing this hegemony with their many differences (Fernandes 2011:61). The traditional old middle class has been able to leverage their generations of wealth, social networks, and cultural capital to fully take advantage of economic liberalisation and although they make up just one third of urban populations they represent two thirds of higher education degree holders (Deshpande 2006:2439). Focusing just on the case of Tamil Brahmins, Fuller and Narasimhan found similar over-representation of Brahmins in the middle class (2014:22). Fernandes cites a privileging of social markers which include not merely being fluent in English but using the right vernacular, not just going to university but going to the right university, living in the right neighbourhoods, and comporting oneself in the right way, in addition to generational wealth, as tools by which the boundaries to lucrative occupational and social networks are kept. Thus, even if more people gain access to the middle class via education and occupation it is very difficult to gain access to upper caste cultural capital and networks if you are not born into them and, so, as the middle class grows so too does the importance of which layer you occupy and thus inequalities are socially reproduced (Fernandes 2011:72–73). Indeed, due to the diversity of the contemporary middle class in India some find the term “middle classes” more accurate (Baviskar and Ray 2011).

Xiang found that investment by lower or middle caste families in their son’s IT education could move the families socio-economic class up in one generation with the increased dowry price they could garner with their son’s now assured future in IT (2007:32). However, upper castes still have many advantages. Fuller and Narasimhan found that Tamil Brahmins have a self-perception
of being innately cleverer, especially in maths, than other communities and that this self-confidence certainly helps their children do well in school (2014: 119). However, access to expensive English medium education necessary for professional IT careers and their attendant class status is predominated by upper castes and thus social reproduction of caste hierarchy is still prevalent (Deshpande 2003:146; Fuller and Narasimhan 2007:126).

While my informants are representative of the new middle class in that they are technology specialists working at the forefront of the global economy, they are ideologically closer to the “old” or traditional middle class in two ways. First, they are for the most part the children of middle class parents and, second, they are more ideologically aligned with Nehruvian development and/or Gandhian renunciation than with Hindutva politics and consumerism. This is evident from their commitment not only to using FOSS to narrow the digital divide but to left leaning (often communist) politics. This is not to say they are necessarily critical of liberalisation per se; they do appreciate the professional opportunities they have been able to take advantage of. However, this appreciation is often tempered by a robust criticism of the exact shape liberalisation has taken in terms of the IT industry's reliance on MNCs and especially with regard to reliance on proprietary software used to run government, education, and the private sector. In contrast to the values my informants espoused, Upadhya (2011: 170) found that IT professionals of the new middle class have a politics “...that embraces liberalisation and individualized mobility and achievement in the name of higher growth rates, while rejecting state policies aimed at social justice and the eradication of poverty.” Thus within the ranks of IT professionals in general, my informants represent a small but significant sector of mostly upper caste liberals who reject many aspects of liberalisation on technical/moral grounds. Indeed it could be argued that FOSS activists are the epitome of traditional liberal middle class intellectuals. They come from mostly upper caste, if not Brahmin, backgrounds where post-graduate education is common for both men and women. The influences of Marx, Gandhi and, amongst some the younger generation, Ambedkar are almost equally felt. They are as comfortable in English as they are in their native tongue and, for some, English is as native as any other language they grew up with. As well, in addition to an avowed commitment to working for and with Indians to improve the nation, there is an easy cosmopolitanism that comes from time spent abroad for school, work, and leisure. The extent to which they are aware of and/or want to mobilise their class and caste positioning will be addressed next.
Class and Caste Consciousness among FOSS Activists
That the engineers involved with FOSS in India are positioned at the cusp of political and economic shifts is in and of itself interesting, but all workers in a globalized world are somewhere on this continuum. Because they help to create these shifts, these workers inhabit a unique position – they are creating the means by which these changes are possible. And, when it comes to FOSS activists, they are using technology, or at least their association with a particular technology, in efforts to transform and disrupt the social hierarchy. The very fact that groups like the FSMK are working with a Dalit community connotes implicit criticism of the class and caste system. The extent to which this criticism is rooted in explicit class or caste consciousness rather than a general desire to ameliorate poverty, however, is not necessarily clear.

According to Deshpande, in the period between Independence and liberalisation the middle class was not especially caste conscious for two reasons. First, there was a general sense (optimism) among the elites who governed that free of colonial rule India could progress into modernity as a caste-less society and this precluded not only discussion but measurement of caste inequality in the census (Deshpande 2003:108). Secondly, because the middle class was inhabited almost exclusively by members of upper castes the issue of caste was not salient in such a homogeneous environment. As government mandated reservations for lower castes were implemented in the 1980s/90s and upward mobility of some from the lower castes followed caste became more visible within the middle class. To explore how my informants, who are overwhelmingly children of the old middle class, were affected by and reacted to the emergence of caste as a conspicuous element of socio-political life I will share some ethnographic data from two generations of the middle class.

Referring back to Rohit, the FSMK activist, I would like to unpack his comment about realizing the students he was helping at the community centre were the children of maids. Indian middle class households have at least a maid who comes daily to clean the home and many also have a cook, a nanny, and, among the upper middle class, a driver. Having domestic servants not only reproduces class and caste relations, as Qayum and Ray make clear, it also naturalizes class and caste based hierarchy (2011:248). When Rohit explained that growing up he always thought you should be nice to maids he was expressing not only his general orientation to treat others well but also hearkening to an idealized feudal relationship characterized by a sense of reciprocal love and loyalty between middle class employers and servants described by Qayum and Ray.
(2011:254). This is not to say that servants were ever considered equal but that they were considered extensions of the family and, indeed, in a time when the elites lived in larger houses they often lived in the same home. To develop relationships with servants and/or their families outside of the middle class domestic sphere is not common, at least among the middle class Indians I knew.

Rohit’s years of involvement with the children in the slum and, to a lesser extent, with their parents who are maids and manual workers, has allowed him to consider the lives of servants in a concrete sense outside of the domestic sphere. This experience, in combination with his left-leaning ideological commitments, strongly suggests that he has cultivated class and caste awareness. To be sure, Rohit espouses anti-caste rhetoric; for example, he lists his surname as “nocaste” on social media and he told me it is necessary to discuss Ambedkar’s writings in any discussion of social justice. Dr. B. R. Ambedkar (1891-1956) was a famous and influential Dalit. An economist and lawyer, he not only wrote the Indian constitution, he is responsible for popularizing the term Dalit, which means broken or scattered, and is the term used to describe those who belong to the community that used to be called “untouchables.” Using the name Dalit as such, which calls attention to the oppression of a class of Indians, was done with a view to claiming a place in the nation-state. Ambedkar’s writings about caste, most influentially _Annihilation of Caste_ (2016) and his critical correspondence with Gandhi are decidedly anti-Hindu. Indeed, Ambedkar converted to Buddhism and advised other Dalits to convert as well for he felt there was no way for Dalits to live dignified lives under Hinduism. That the community computer centre in a Dalit slum would be named after Ambedkar is not surprising as Ambedkar is very important to many Dalit communities. That there is a portrait of Ambedkar in the FSMK office and that middle class software engineers like Rohit find him inspirational does speak to a radical politics that is not especially common even amongst other left-leaning FOSS activists. Rohit’s commitment to breaking down class and caste barriers does go against most contemporary middle class politics. However, Rohit told me that he does not share details of his activism with his family back in Kerala, indicating that they may not approve. It is also unclear to what extent he or other middle class professionals who wish to change caste and class hierarchies will change their lifestyles in accordance with anti-caste rhetoric, for example living without domestic servants from lower castes.
One way I did observe upper caste members of the FOSS community demonstrate their commitment to breaking down caste barriers, or at least Brahminical hegemony, was by eating meat, especially beef. I remember particularly well meeting an activist from the FSFTN for lunch at a posh café in central Chennai and him ordering a beef burger. Public consumption of beef by middle class Hindus is a performative act of social critique, one that Dave found in her research with Indian animal rights activists expresses “cosmopolitanism and progressive politics” (2014: 436). Strict vegetarianism is often associated with certain strands of Brahmin Sanskrit religiosity which also includes teetotalism and which has been embraced by right-wing Hindus. Many find this adherence to purity problematic because it leaves out all communities who eat meat, especially beef, including Muslims, Christians and lower caste Hindus. It must be noted that for Hindus from Kerala and West Bengal the consumption of meat, even beef, is more socially acceptable but within the rest of the country, even in urban centres, it can be scandalous. For an upper caste Hindu to eat meat (and/or drink alcohol), then, demonstrates rejection of orthodox definitions of what it means to be a good Hindu. Several people told me about events organised or attended by members of the FOSS community that included the cooking and sharing of vegetarian and non-vegetarian meals in public. This is not to say that everyone in the Indian FOSS community is equally radical when it comes to the politics of food – some of my informants were strict vegetarians – but for a significant portion of the FOSS community demonstrating that they are willing to share meals with people from different castes and religions is an important political practice.

Moving away from the younger generation of the Indian FOSS community I will now examine how a group of older upper middle class Brahmins are currently wrestling with issues of caste and class. During my first month in Chennai my key informant, Karthik, invited me to a book launch in central Chennai. The book, “Essential Writings of Dharampal” (2015) was a collection of essays by a self-taught historian who had been deeply inspired by Gandhi. Although this book launch had nothing to do with FOSS it had everything to do with a certain kind of person who supports FOSS, i.e. my key informant’s social set: liberal, middle class Brahmins. When I arrived there was a small crowd of about twenty men and women milling about and Karthik introduced me to about ten people – some professors, an Ayurveda doctor and her husband who teaches yoga, and a female software executive. I asked Karthik about the group of people and he said he had known them all for a long time – most have postgraduate education and had worked
in the US but they all came back to India in the 1980s/90s to contribute to Indian society. He further explained that this was the “alternative” set of people who are into alternative medicine as well as alternative software. There were six or seven speakers who addressed various aspects of Dharmapal’s work.\(^{36}\) Several speakers focused on colonialism and the colonial mind-set that lingered after Independence. One speaker was a Dalit politician. Another speaker argued that Dharmapal’s most famous work “The Beautiful Tree,” which used British statistics and documents to show how advanced Indian education was before colonialism, was not in actuality beautiful at all because the education, as good as it was, was by and for Brahmans and completely excluded Dalits and women. There was a lot of talk about harnessing India’s inherent strengths and doing things in an Indian way rather than through a Western frame. Finally, around 8pm, some of the points made were hashed out and then a lengthy discussion followed about which pieces of Dharmapal’s work should be translated from English into Tamil for a wider, younger audience.

Three things strike me as significant about this book launch: 1) a group of older Brahmin professionals invited a younger Dalit politician to the event, 2) that this is a group of people who studied and worked abroad but returned to India, 3) that they wish to have the book translated into Tamil. As Karthik explained it to me later, the inclusion of a Dalit politician on the agenda was a somewhat bold move as the politician was roundly critical of Dharmapal in particular and the group at the book launch in general. Karthik felt that it was good to include this kind of critique. That a group of older upper caste middle class people is open to critique certainly does speak to a level of caste and class awareness. That this group of people returned to India from the US in the 1980s/90s demonstrates their commitment to Nehruvian development long after the brain drain had started and most of the middle class was disillusioned with post-Independence rhetoric (Deshpande 2003:147). Finally, it is significant that it was felt that to reach a younger, wider audience Dharmapal’s work should be translated into Tamil as, outside the upper middle classes, English is not widely used.

The extent to which my informant’s relationships with Dalits in the context of middle class identity in general and FOSS activism in particular translates into class/caste consciousness is beyond the scope of this research project. Caste was rarely brought up by my informants and

\(^{36}\) Three spoke in Tamil but a man who was helping run the event sat by me and took notes when the local Dalit politician was speaking passionately in Tamil (all I heard was Marx).
whenever I broached the subject it was mostly discussed as an abstract and rarely as a personal issue. That inter-caste association and socialisation was often given as an example of the mission of activist groups speaks to the sincerity of my informant’s wish to at minimum address caste and class. However, it is important to keep in mind, as Subramanian reminds us in her analysis of how caste is simultaneously mobilised and dismissed as unimportant at IIT Madras, that many members of the upper castes have a “...sincere commitments to universalistic ideals of equality, democracy, and rationality. At the same time, they are able to inhabit a universal worldview precisely because of a history of accumulated privilege, a history that allows them a unique claim to certain forms of self-fashioning” (2015:296).

**Middle Class Social Movements in India**

Social movements are generally understood as collective action for or against a social and/or political issue to affect change. Social movements can incorporate any segment of society however the literature on social movements generally focuses on movements from the left and from below (Staggenborg 2008; Tilly 2004). There is a fair amount of literature on social movements in India, however most of it is focused on the subaltern (Omvedt 1994; Ray and Katzenstein 2005; Shah 2004). Since Independence there have been three large-scale social movements spearheaded by the middle classes, protests against: the reservation system, political corruption, and sexual assault. Following the 1990 Mandal Commission which led to the expansion of the reservation system, which is constitutionally mandated affirmative action in certain state sectors for members of caste and other groups deemed historically disadvantaged, for Other Backwards Castes (OBCs) in addition to Scheduled Castes and Scheduled Tribes (SC/STs), many upper caste middle class Indians organised and protested “the end of merit” by initiating strikes, dressing as street sweepers to represent their low caste futures and even by self-immolation (Subramanian 2015:311). The perceived threat to merit that the expansion of the reservation system represented to the upper caste middle class certainly did mobilise Indian elites around ideas of fairness and modernity in ways that could only work for the upper castes who were rendered “casteless” post-Independence. In their analysis of the anti-corruption movement of 2011 and the anti-rape protests of 2013 De and Kim found that these large-scale New Delhi based protests were able to recruit unprecedented participation by the middle classes because the issues, anti-corruption, and anti-rape, though presumably of concern to all segments of society, were easily enfolded within the urban middle class moral compass because these highly
publicized events which featured middle class protagonists made corruption and injustice explicit within the urban middle class context (2016: 17-18).

Although not included in the literature on Indian middle class social movements there are several social movements that are populated and run by members of the middle class, even if the aims of such movements are not necessarily middle class specific. Examples include causes important to the social left such as environmentalism and feminism. Another example is that of the People’s Science Movements which describes diverse of groups who organised around the social and environmental implications of science and technology in India. Varma notes that most members of the People’s Sciences Movements come from the educated middle class yet their class positioning does not determine their organisational aims (2001: 4797). To the extent that the focus of most People’s Science Movements is not class based per se this is correct yet I would argue a more accurate characterization would be that the concerns of many of the middle class members of the People’s Science Movements are concerns of the Independence era middle class about pursuing development in an Indian way. One group that exemplifies this is the Patriotic and People Oriented Science and Technology (PPST) collective which was started in the late 1970s by Dharmapal and a group of young science and technology professionals based in Chennai. The aims of the PPST included:

- Evolving the basis for a science and technology having its roots in the Indian scientific and technological traditions and oriented towards meeting the needs of the Indian people.
- Evolving an outline of how a self-confident and functional Indian society with its distinct Indian-ness can emerge around a nucleus of concepts, techniques and structures drawn from the functional aspects of Indian culture and civilization.

Inspired by Gandhian ideas of appropriate technology, development, and rooted in concerns of how to reconcile modernity with colonialism, the PPST’s desire to create and use technology by and for Indians is fairly representative of what is now the older generation of FOSS activists. And while some of the younger generation of FOSS activists may eschew Gandhi in favour of Ambedkar they, too, are deeply invested in creating technology in an Indian way that will benefit Indians. To better assess the implications of Indian FOSS activism within the context of social movements we will now review the relationships between FOSS, technology, and social movements in closer detail.

It has been acknowledged (Nash 2004; Staggenborg 2008) that new information technologies have advanced and even defined many social movements (for example, Occupy Wall Street and the Zapatistas) however, within the social movements literature there are as of yet no examples of social movements about new information technologies. And although Kelty does not conceptualize Western FOSS as a social movement Richard Stallman and the Frees Software Foundation do see their advocacy for free software as an explicit social movement.\(^{38}\) All of the Indian FOSS groups who prefer the term free software also consider their organisations as participants in social movements. While it is certainly true that not everyone who creates or advocates FOSS share the same ideology, my research into the same technology in an explicitly political context indicates that FOSS activists certainly see FOSS as an indispensable tool to achieve wider social change. To date FOSS centric projects have been used to improve the quality and structure of the education system, provide linguistically diverse software to non-English or Hindi speaking public, create software to be used by the blind, increase women’s participation in IT, and, generally ameliorate poverty amongst disadvantaged groups like the Dalit community discussed in this chapter. Significantly, even more technically engaged members of the Indian FOSS community who prefer the term open source software often discussed evangelism, support for projects to bridge the digital divide, and participation in select political movements, most recently against Facebook’s Free Basics program discussed in Chapter Seven. Time will tell if the social change wrought be FOSS activists can be understood as a unique technology specific social movement. I argue that the use of FOSS as a social tool to affect wider social change is in fact an extension of “improvement” work for the worthy poor that has been carried out by the Indian middle class since before Independence.

**Staying in India**

Like other developing nations India wrestles with a brain drain in which many highly skilled people move to more prosperous countries, often the United States, the United Kingdom, and Australia, to pursue their careers. Abraham notes that migration by middle class upper caste Indians is often framed as their only option for success due to their conviction that the reservation system makes it impossible for them to get ahead in India (Abraham 2017: 693). Although the Indian IT industry attracts many IT professionals I heard a common refrain from people in industry and academia that the very brightest engineers leave India to pursue education

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and work opportunities which are deemed to be both more prestigious and to have higher earning potential. One informant invited me to his office at an IIT the morning he was going through applicants for the PhD in computer sciences programme. He lamented that the best students tend to do their post graduate education in the United States never to return, so he was forced to accept second tier students into one of the nation's first tier universities. While only about one third of my informants had studied or worked abroad about three fourths of them had the education, experience, resources, and connections necessary to easily acquire necessary visas if they wanted to. Only a handful of FOSS students and professionals that I met shared any desire to leave India for education or work. Indeed, many of my informants had repeatedly turned down offers to work abroad, mostly in the United States. That said, about half of my informants had close relatives living abroad (once again mostly in the United States) and over half have travelled abroad for work or to attend conferences. To understand why this group of IT professionals who advocate for FOSS seem to defy the brain drain we will need to look at four converging factors: commitment to small d development and nation building in the liberal tradition discussed above, preference for the relatively high standard of living they can enjoy in India that allows them to incorporate “traditional” Indian values such as caring for family, the increased opportunities to do interesting and well paid work in India using FOSS and, finally, plenty of opportunity to travel and stay abroad via work trips and relatives they can stay with. Exemplifying a patriotic commitment was 37 year old Bangalore based FOSS entrepreneur, Dev, introduced in earlier chapters. When I asked what motivated him to stay in India he replied: “I wanted to question the… common understanding that number one you can’t build products in India, software products. And number two that you can’t do high technology work in India. And I said why can’t we?” He then articulated a sense of obligation to the government:

So growing up we had this notion that you know a lot of brilliant people study in public colleges in India and then they migrate abroad and they settle down there and they give their best to another country. And the thing is they initially studied at public expense… I can’t study in a public university and then – I had a job which would have sent me to Cyprus but I didn’t take that… because I wanted to stay back… My belief was that there’s such a lot great technology which exists as free software but unless someone comes in and sort of packages it, puts commercial support behind it, and makes it easy to use no one’s going to just use it. ...so that’s what drove me to set up the company...
Although many people I met expressed a desire to give back to their communities and nation, Dev is the only one who explicitly tied his government subsidised education to a feeling of obligation.

Also espousing a commitment to nation building is Rashmi, also from Bangalore. She told me that she wants to live in India so she can change things for the better. She said the reason she has not applied for a PhD yet is because she is scared that if she leaves India for the PhD she will not want to come back. She does not appreciate the pollution in India and when she travels abroad she loves how clean it is in Europe and the US so presently she is struggling with what she feels is a lower quality of life in India and her desire to stay and change the issues she does not like. Both Dev and Rashmi are representative of socially engaged members of the Indian FOSS community who make explicit ties between their involvement with FOSS and their desire to improve India. Of course this does not mean they are uncritical of India – far from it – but their critiques are translated into motivation to stay in India even if it is not always the easiest choice.

Sanjay, a software engineer who is originally from rural Tamil Nadu but now lives in Bangalore is in his early thirties and is married with a three year old daughter. While discussing his thoughts on the Indian IT industry Sanjay said one thing that makes open source in India unique is that many of the really good people leave the country to work elsewhere. He has been offered a job in the US by his current company, which is headquartered there, but he declined. When probed about why he chose to stay in India he replied:

I feel that if you’re a programmer it is best if you’re outside India, it’s best if you are in Silicon Valley or you’re in Europe. But at the same time I like the family kind of culture here, so that is the only reason that keeps me here – otherwise I hate everything here [laughs] right from traffic to our pathetic health care to our roads, everything in our country is bad, especially in cities it is very, very bad. And in spite of all that we are staying here... because of our family... we stay with our parents... they took care of me when I was young so I want to take care of them when they are old... And I want my daughter... to be growing up in a place where the family ties are strong. Which is probably not the case in US. I am not saying it’s a bad thing... it’s different... Otherwise if there was [a] way for me to telecommute like in Star Trek I would go there and work and then come here. Because all the smart people, I mean anyone who is half decent leaves India. So only people who stay in India despite being smart are those because of the family ties, otherwise everybody will leave.

Sanjay’s engagement with FOSS is primarily technical. Before he was married he spent all his free time contributing to prestigious international FOSS projects but since he has married he
prioritises his family and only spends as much time as needed at work with very little time to spare for anything else. His commitment to FOSS could have easily led him to move to the US but now his commitment to his family has eclipsed all other concerns. His decision to stay in India, then, is tied to his belief that it is better for his family.

Rav, a Tamil Brahmin who is at 41 is a computer science professor at IIT Bombay has been asked to work in the US several times but has never been tempted because, as he explained it, he has strong religious views that are easier to maintain in India. During our interview he spoke at length about how although he considers himself liberal he is deeply committed to his Hindu faith, which includes being a strict vegetarian. Additionally, being a professor at an IIT he is provided with all the resources he needs to do his job as well as subsidized housing and a decent salary. He was even allowed to take a two year sabbatical in order to set up the Indian branch of an American IT company. Given all the perks of his job and the relative comfort his salary affords him, staying in India is an easy choice.

Lakshmi, a 30 year old woman living in Bangalore did her Master’s in the US but living in the US was very lonely for her. Almost everyone in her Master’s program was Indian and she made no American friends. Everyone at her engineering job in the US was white and she said the other engineers would talk about drinking and bars and that she would just quietly do her work and go home to cook and sleep. She came back to India after the financial crisis in 2008 and has revelled in the lifestyle she can maintain as a Python freelancer. She will work on a project like mad until it is done (often getting paid in US dollars) and spend her free time trekking, dancing, making art, and writing. She wants to keep travelling but she is adamant that Bangalore is home and she cannot imagine living anywhere else. While it is not unheard of for coding freelancers in the US to make enough money to pursue their other interests in between projects it is not a realistic option for many. That Indians are able to make enough money to live well and do fascinating work with FOSS while maintaining family connections is certainly a reason to stay.

Many of my informants had relatives living abroad and would regularly make trips to visit them. In addition, at least half of the people I knew had travelled abroad to visit home offices for MNCs they worked at or to attend FOSS specific conferences. Finally, with relatively high wages it is possible for many IT professionals to take foreign holidays in addition to visiting family who live abroad. At this point in time the upper echelons of the Indian middle class can
afford a much higher standard of living, including having servants who do all the cooking and cleaning, and still travel out of India on a regular basis if they so desire. For some of my informants the choice to stay in India is based on a sense of national obligation perhaps unique to the FOSS segment of the IT industry, their choice to stay in itself is not unique among the Indian FOSS community or Indian IT workers more generally, as Fuller and Narasimhan (2007: 148) and Upadhya (2012:175) had similar findings. For this admittedly narrow slice of Indian society it really is the best of all worlds.

**Conclusion**

To understand the Indian FOSS community it is imperative to understand that they overwhelmingly come from the middle class upper caste backgrounds whose families have been firmly ensconced in the urban middle class for several generations. Further, although technology work is associated with the growing new middle class, the majority of the FOSS community are best understood as ideologically closer to the old middle class. One salient aspect of old middle class values is to engage with nation building and the sometimes difficult decision to remain in India rather than join the brain drain needs to be understood, in part, as a commitment to improving India.

Whether the Indian FOSS community should be considered a social movement is debatable but there are strong ties between the FOSS community and earlier politically engaged science and technology based movements. The majority of the Indian FOSS community conceives of FOSS as a technology that can be made Indian and that should be mobilised in efforts to improve the lives of all Indians. As well, a significant number of the community engage in activities beyond evangelism in efforts to spread the ideology of FOSS in ways that ameliorate poverty. In this way, they are using FOSS as a social as much as a technical tool.
Chapter 5 – Limits to Freedom and Potential for Openness: Gender and Indian FOSS

Introduction
As has been made clear by now, the freedom and openness inherent to FOSS represent more than technical transparency; freedom and openness are also a way of being, a practice. This embrace of the philosophical principals of FOSS is said to encompass a critical and engaged positionality in society more generally. In many ways, through activities to improve the education system, bridge the digital divide, and protect civil liberties, the Indian FOSS community does question and address what they feel are societal problems. However, despite a sincere commitment to freedom and openness as technical and philosophical tenets, the Indian FOSS community also demonstrates limits to freedom and openness. Although the global and Indian FOSS community is premised on an ideal of meritocracy in which anyone with the know-how is welcome to participate in the community, in practice the global and Indian FOSS community is predominated by middle-class men. There are women active in FOSS, but their experiences and contributions are qualitatively different from their male counterparts.

During my fieldwork I found that gender is a significant issue in the FOSS community generally and in the Indian context specifically. When reading through the anthropological research on FOSS, however, one is struck by the how gender is left out; not only are women not mentioned but neither, really, are men. Kelty does acknowledge the omission of women in footnotes (2008: 312n19, 318n19) and alludes to the maleness of the FOSS community with remarks about the love of heavy metal music amongst “geeks” in Bangalore (2008: 45) and how the presence of a woman at a conference dinner distracted the (male) keynote speaker (2008: 244) but throughout the ethnography of mainly Western FOSS enthusiasts acknowledgement of gender (like class and race) is left out. Kelty is not alone in this seeming aversion to acknowledging and discussing gender issues in the FOSS community. For example, aside from noting that hackers are predominantly male Coleman (2012: 25) also leaves gender as an analytic tool out of her ethnography of (mainly) American hackers. Indeed, Leach, Nafus and Krieger (2009: 66) note the singular lack of gender in the research on FOSS and bring attention to the hierarchical and gendered nature of the FOSS community, namely that most participants are male.
In this chapter I will address how gender both shapes and is shaped by the FOSS community. Using the ideals of freedom and openness championed by my informants as a lens through which to explore the possibilities and limitations experienced by men and women, I will examine how the men and women I knew navigate their relationships to work, family and the FOSS community. First I will discuss how the institution of the family shapes how women and men approach careers in IT as well as how working as an IT professional shapes home life. I pay special attention to how ideas and ideals of femininity and masculinity are reinforced. I will then discuss how freedom is understood and experienced by men and women in the FOSS community and how ideas of merit and the “women in technology slot” keep women’s participation peripheral. In doing so I will address what is and is not unique about gender in the Indian FOSS context as well as what this says about the limits and possibilities of FOSS when it comes to addressing entrenched sociocultural norms.

**Freedom and Responsibility at Work and Home**

The wishes and needs of parents have a very strong pull on the lives of their children well into adulthood. Most of my informants’ choices in education, career, and marriage were done in consultation with and occasionally even directed by their parents. This is not to suggest that the middle class IT professionals I studied do not exert autonomy over important life choices – they do – but to make clear that when it comes to major life choices familial obligations can be valued more than individual wishes. To understand what freedom means to my informants it is necessary to understand, as they do, that personal autonomy in every aspect of life is not necessarily their goal. It is also essential to understand that familial obligations are gendered. In this section I will explore how the tension between individual freedom and familial responsibility are gendered for Indian IT workers generally and my informants specifically by looking at how ideas of tradition and modernity are articulated in education, work and family life.

**IT Education and Career as a Family Concern**

Although always prioritized, engineering education has ‘mushroomed’ in India since the 1990s as students (and private colleges) hope to cash in on the outsourcing boom. In 2016 there were nearly 4.9 million engineering students nationally.\(^\text{39}\) Although a four year engineering degree is

more expensive than a three year arts degree, especially at a private college, many engineering students told me their parents wanted them to pursue engineering because they believe it will have better job prospects. Following from better job prospects are better marriage prospects, which many people cited as an important factor in choosing this line of education and work. This anecdotal evidence is supported by Xiang’s findings among IT workers in Andhra Pradesh whose families found paying high tuition for a son to get an engineering degree a sound investment because it would result in a substantially higher dowry (2007: 34). Although historically women did not pursue education in equal proportion to men (and this is still true), today in most Indian engineering programs there is a high (if not equal) proportion of women. Indeed, unlike in North America and Europe, in India there is not an assumption that women are less intellectually capable in maths and science (Gupta 2012: 162; Fuller and Narasimhan 2014: 146). The reasons middle class women historically did not pursue technical education and careers had to do with the relatively few women who pursued post-secondary education at all as well as the concern that traditional engineering work such as mechanical or civil engineering was socially “dangerous” for women because it entailed working in “dirty” industries alongside men who performed manual labour (Fuller and Narasimhan 2014: 145). The reason middle class women are now pursuing higher education generally and engineering education specifically have to do with the social appropriateness of office based IT work and the opportunities such a degree confers both in job and marriage markets. Gupta attributes this to traditional patrifocal culture in which parents’ investment in a daughter’s engineering education is conceived as win-win in that engineering education is presumed to lead to prestigious employment and/or better marriage matches (Gupta 2012). Although none of my informants cited dowry, coming into the family via daughter-in-law, or even marriage as their main motivation to study engineering, they did discuss that as a strategy of some of their classmates. For example, Priti, a 21 year old computer science graduate, told me that half of the women in her cohort were engaged by graduation and would not pursue careers. Although some women do pursue a technical education as the means to a better marriage match and have no intension of working professionally, many women who

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40 While government administered universities and colleges have caps on tuition, private colleges do not and are managed as for-profit enterprises. Further, as this report shows, this investment in engineering education does not help most students as 80% of engineering graduates are considered unemployable: https://www.hindustantimes.com/india-news/is-the-engineering-dream-over-after-iit-students-now-prefer-mba-and-govt-jobs/story-skQp6FdebWG7o1qSnnDUKO.html accessed 20/7/2018.
graduate with an engineering degree do pursue a career. However, the ability to choose to pursue a career, and for how long, is dependent on a woman’s family supporting that choice.

For most women the opportunity to study and work in the IT sector is one that is only possible because their parents feel it is in their best interests. Several young women told me how grateful they were to their parents for allowing them to pursue postgraduate education and/or work professionally in their twenties rather than getting married as soon as they completed a Bachelor's degree. Exemplifying this is Priti, mentioned above. Priti told me that many of the women she knows who do work after graduation are not ambitious about their career because they do not plan to work after they get married or have children. This observation is reflected in Radhakrishnan’s finding that HR departments in IT firms consider only women who have worked for more than five years as serious about career, as there is high attrition at under five years when women leave for marriage or to raise children (Radhakrishnan 2009: 203). Priti explained that for men, though, they have to go to work and make as much money as possible and that among the men she graduated with it is preferable to get a job right away rather than do postgraduate work, unless a company pays for it.

Priti plans not only to pursue postgraduate education and career, she also plans to work throughout her life. At the time of the interview she was preparing to do a Master’s in the United States in a few months. When asked what motivated her to pursue a Master’s degree right away, she said that from a young age she knew she wanted a PhD and that her parents support her in this ambition. She plans to work for a while after the Master’s and then go on to a PhD. She said that many women she knows are not even allowed out of the house on their own, even if they come from educated middle class families, so she is very grateful to her parents, and her father especially, for giving her the freedom to do as she wants. However, despite their relatively liberal attitude towards her goals her parents do expect her to maintain traditional roles and have given her a deadline for getting married: age 25. She is happy to comply with this and also to have her parents arrange the marriage, explaining “I would rather they take care of all that rather than... taking the tension of going and finding someone for myself.” There are a lot of families in her father’s circle who have sons so that is probably where they will start looking. Her parents are

41 In a 2017 NASSCOM report it was estimated that women make up 30% of the Indian IT industry. However, women are more prevalent at lower levels of the industry and are underrepresented in upper management: [http://gsm-it.com/userassets/Publications/GSM-IT_SCORECARD-INDIA_Spring_2017_web.pdf](http://gsm-it.com/userassets/Publications/GSM-IT_SCORECARD-INDIA_Spring_2017_web.pdf) accessed 31/7/2018.
aware of her academic and career goals and would not match her with someone who expected her to be a home-maker. Additionally, she has veto power – she said it is their job to find the match and her decision to say yes, adding:

At the end of the day it’s my life and I have to spend my life with that person. If it’s not going to be... compatible with my career I am really [not] going to you know sacrifice myself – glad as I am that my mother was a home-maker and she was there for me at every step of my decision making... I don’t think I can be that kind of person – stay at home – at least not at this point of my life.

Priti’s situation exemplifies what Fuller and Narasimhan observed with the rise of companionate marriages amongst IT professionals in Chennai wherein families of the bride and groom recognise that their children’s preferences need to be accounted for to ensure a successful match (2008). In Priti’s case, this means that her parents not only support her ambitions but also do not feel it will be difficult to find a groom who is happy to have an ambitious wife. Not all women have parents who are as supportive as Priti’s and not all potential husbands are looking for working wives. Indeed Fuller and Narasimhan found that many men in IT state a preference for “home-loving” wives who do not work (2007: 138). Still, once a woman’s parents have found an agreeable husband who is happy enough to have a wife working full time after marriage and/or children are born, women in IT must then negotiate how to fulfil their employment and family obligations.

Balancing Tradition and Modernity through Respectable Femininity

The fact that the opportunity to work is granted by men has obvious gendered implications but it is also an issue of class and caste. Traditionally, most middle class women did not work and, among upper castes, particularly Brahmins, women were secluded lest their innate purity as members of a high caste become polluted by the outside world (Fuller and Narasimhan 2014: 123). The ideal of a pure woman taking care of the home and family while men dealt with worldly matters was embraced during the nationalist movement, which as discussed in Chapter Four, was the purview of the upper caste middle class. Middle class nationalists wedded the Victorian ideal of domestic womanhood with traditional ideas of purity and dichotomies of inner/outer and spiritual/material to solidify what a respectable Indian woman was; in other words a respectable Indian woman is a middle class woman who focuses on the domestic sphere and puts family first (Radhakrishnan 2009: 200). Though from Independence some middle class women have worked professionally it has only been within professional roles which allowed
their respectability such as ‘clean’ office work or teaching (Fuller and Narasimhan 2014: 137).

As more and more middle class women entered post-secondary education through the 1980s and more and more lucrative opportunities became available during the IT boon in the 1990s, professional IT work has become a space where, what Radhakrishnan terms, respectable femininity has blossomed. Radhakrishnan uses the concept of respectable femininity to understand “...the abiding ways in which gender, class, and nation constitute one another in a postcolonial society undergoing rapid socio-economic change” (2009: 198).

Women who work in IT come from middle class backgrounds and, in general, do not need to work as their parents (mainly but not exclusively fathers) or husbands presumably earn enough to support them. Many IT companies accommodate the reservations of parents, husbands, and women themselves through paternalistic efforts meant to maintain respectable femininity such as providing transportation to and from home (Patel 2015: 20). However, the salaries women make as IT professionals are significant and these contributions to the family can give women some autonomy vis-a-vis family relations. In balancing the desire to work with family commitments women in Indian IT deploy their respectable femininity through performative modesty and putting family first (Fuller and Narasimhan 2007; Radhakrishnan 2009). This entails maintaining gendered norms of femininity such as conservative dress and refraining from inter-gender socialization outside of the office as well as ensuring that their work commitments do not interfere with more important commitments to their husband and children. Of course individual women fall somewhere on a spectrum of their willingness and ability to prioritize family first, below I will detail two women who fall on either end of the respectable femininity spectrum.

Exemplifying respectable femininity is Arivindha who works at the AU-KBC. By working out of a relatively relaxed research centre housed in a university campus, Arivindha, who is 28, has found a way to do work she enjoys and also take care of her family. Arivindha is a slight woman with long hair worn back who dresses in long kurtas and churidar at the office. As discussed in Chapter Two, she has a five year old daughter whom she brings into the office most afternoons. Her daughter spends the afternoon napping across two office chairs and/or running around the lab playing with the other employees, who all dote on her. When I remarked on how agreeable the situation was Arivindha told me that this arrangement is rare and would not be possible in other offices. She also gets help from her in-laws who watch her daughter when they are visiting
from their native village several hours away. When they are not visiting she uses a day-care centre on the campus. She pays Rs 2000 a month for day-care, which is a really good deal as it would cost around Rs 10000 elsewhere. To better understand what working full time with traditional family responsibilities entails I asked her to take me through a typical day.

In the morning she gets up earlier than her husband to prepare food and get her daughter ready, her husband then takes their daughter to school while she goes to work. At 1:30pm she picks up her daughter from preschool, takes her home for lunch and if her in-laws are there leaves her, if they are not visiting she takes her back to the office with her. Her husband, a mechanical design engineer, leaves the house at 9:30am and returns around 8:30-9pm. He does not work on Saturdays, though Arivindha often works half days on Saturday. She finds it very difficult to keep up with all the cooking, cleaning and childcare so she has asked her in-laws to stay as often as they can so she can focus on work. The in-laws visit often but they prefer being back in the village where they know everyone – her father in-law in particular does not like staying in the city because unlike his close knit relationships in the village, in the city he gets quite bored and has no one to socialise with. Her own parents who also live in a village several hours away do not visit because they are still caring for her younger sister who is still at home.

Before she was married she lived in a women’s hostel, which is where most unmarried women reside if they leave their family home for school or work as renting apartments is particularly difficult for single women in India.42 Prior to marriage Arivindha regularly participated in FOSS events such as LUG meetings. She was close friends with the women in her hostel and her co-workers and would socialise often. She used to stay late at work to meet deadlines. She explained that although some people feel it is not safe for unmarried women to do so, that it was fine at the AU-KBC. Now that she is married with a child she does not have time to participate in any activities outside of work. She has also given up being a vegetarian because her husband eats meat and she has to cook for him. Sometimes she will have lunch or tea with co-workers in the canteen but not often because usually she has to spend her lunch break shuttling her daughter to and from preschool.

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42 This article in The Hindu, a popular south Indian daily newspaper, highlights the challenges of renting for professional single women: https://www.thehindu.com/news/cities/chennai/city-cold-to-single-women-living-alone/article2971829.ece#! Accessed 31/7/2018.
When asked what she hopes for her career she said that she had thought of getting a job at another company that would pay more but has decided to stay in her current position because it allows her to take care of her family and work. She lives just ten minutes from work so she can work late if needed but other jobs are farther away and she would not be able get to and from home in time to cook dinner. She explained that she does not even have to work because her husband makes good money but that she wants to. She spent the first year after her daughter was born at home and she did not like being alone all day while her husband was at work. After a year at home she was more than happy to come back to work with people and think about “other things.” When she first returned to work she had to send her daughter to her mother’s house in the village for three or four months until she was old enough to be put in day-care during work hours. During this transition period she would visit her daughter on the weekends. She said this is a common practice – to get help with children from one’s mother or mother in law while working.

Arivindha’s balancing act between tradition and modernity is one of the tropes of Indian women in IT but it is also an act that is difficult to maintain. Radhakrishnan calls this the “tricky space” in which women must negotiate their desire for independence through work that stimulates them and their often equal desire to maintain traditional respectability (2009: 204). Many Indian IT firms are willing to accommodate working women who put family first because these women are seen as more loyal employees, however Radhakrishnan notes that single women are not offered similar concessions (2009: 208-9). Arivindha is very fortunate to have a job that offers so much flexibility in addition to a husband and in-laws who support her desire to pursue work outside of the home even though her income is not necessary. However the flexibility of her work and family must also be understood as reflections of national conversations about what Indian modernity entails.

On the opposite end of the spectrum is Lakshmi who has been able to parley her IT career into a personal autonomy that is decidedly not traditional. Lakshmi, who sports short hair and tattoos, is in her mid-thirties and comes from a middle class Bangalore family. After completing her masters in engineering and working for a while in the US, she came home and agreed to an arranged marriage to please her parents. However, the marriage did not work out as she had hoped. Her husband did not allow her to work and wanted her to ask permission to pursue
interests outside the home, often getting angry at her for going out and associating with other people, especially men. Her mother-in-law was also controlling and would insist that she put flowers in her hair and wear bangles whenever she left the house, both symbols of traditional femininity. After nine months of marriage she left her husband and got a divorce. Before this experience it had never occurred to her that getting a divorce was an option. She explained to me that when she was younger she assumed her life would be to grow up, get married, and have children. This assumption was based on her growing up in a very traditional family that emphasized both gender norms and gender segregation.

In many traditional Indian educational institutions, from a young age and up through university, boys and girls are socially segregated so that even though they are attending the same classes fraternization is discouraged. When she was growing up, Lakshmi’s mother insisted that she not talk to men, especially in public, which led to her being afraid to talk to everyone but especially men, in case they might think she was being forward. Lakshmi internalized the tenets of respectable femininity to the extent that when she was working in corporations with primarily male colleagues she never felt comfortable having a conversation beyond what was necessary to get a job done. She found company sponsored social events especially difficult as she could not partake in casual drinking and socializing with her male colleagues. Following her divorce Lakshmi has explicitly rejected respectable femininity, embracing individual autonomy on her own terms. She told me that now she talks to whom she pleases as well as drinks and smokes.

While sharing how she has learned to value her own needs and desires, Lakshmi emphasized how rare it is for Indian women to even know what it is they might want for themselves outside of the family. She said that with that all the work women in traditional Indian families have to do they never have time to figure out what they themselves would like to do with their lives, nor do they have the time or freedom to do anything if they do figure out something outside of family life:

Women have children to take care of, women have parents to take care of, women have in-laws to take care of. The way a man would take care of his parents is totally different from a woman taking care of her parents... When a son is taking care of his parents all he has to do is pay up their bills and that's about it, and then his responsibility's ended. On the other hand, when a girl is taking care of her parents she... just doesn't pay the bills she actually takes care of the parents. She does the housework, gives them the medicines, puts food on the table, cooks for them... When a baby is born man's responsibilities ends
the moment he pays the bills... but the woman's responsibility: she has to feed the baby, she has to take care of the baby, she has to put it to sleep and then she has to – after all this she has to go back to her husband and do the set of responsibilities... Right from below poverty lines... there is no distinction... even if you are rich you're still doing the same. I hardly see any man walking out at night and trying to see that the gates are closed, the windows are closed… no man does that, women do that... getting out of the house is out of question… And after all this she never has the time to actually go into her own self and find out what is she wants to do with her life apart from what she's been doing...

Although Lakshmi’s observation that regardless of income level women do the majority of work in the house is taken it must be added that in middle class homes there will be at least one servant who comes in on a daily basis to clean, cook, and/or care for children, which does take some burdens off wives and mothers. However, the hiring, management and firing of servants is also the woman’s responsibility.

Lakshmi is not representative of Indian women in IT generally but her story is useful in that it shows the possibilities for personal autonomy made possible by financial independence. Although others have noted that high salaries of women in IT can give them negotiating power within the family (Fuller and Narasimhan 2007: 141; Radhakrishnan 2009: 203), for Lakshmi it allowed her to negotiate her way out of family responsibilities entirely. In fact, she used money she had saved to build her parents a house and, once she did that, she felt her obligations to them were over. Now she lives alone and uses her income to pursue her own interests in art and travel. She credits her ability to do so to FOSS because the work she now does is about her and not about any other responsibilities a woman might have to her family: “It's about me; that's one of the things that FOSS gives me.” She said this kind of personal freedom (as a FOSS freelancer) is not possible in corporate culture. Even though she puts in more hours working now than she did in a corporate job she loves what she is doing. Although Lakshmi’s break with traditional work and marriage have given her the kind of freedom she wants her strategies would not necessarily be viable or appealing for those women working in IT who enjoy their work but also identify as traditional Indian women as Radhakrishnan found (2009: 209-210).

**Hegemonic Masculinity in Indian IT**
While there is a lot of research on women in engineering and what participation in this male dominated field means with regard to constructions of femininity, there is very little research on how masculinity in engineering is constructed and experienced. Notable exceptions include
Faulkner’s (2000) study of gender and dualism in software engineering, Ensmenger’s (2015) documentation of how male programmers mobilised their own form of masculinity in efforts to ‘professionalize’ and simultaneously exclude women from computer science, and Hughes’ (2017) study of how openly gay engineering students navigate hegemonic masculinity whilst in university. Still, the vast majority of research on gender and technology is focused on the case of women as an exception. Of course the focus on women’s experiences points to the hegemonic nature of masculinity of engineering. So while there is scant research on the explicit nature of masculinity in engineering, the majority of social science research on engineering implicitly discusses gender from a male perspective, even when it focusses on case of women as the exception. In the following discussion of masculinity in the Indian IT industry I want to make clear that I am using the term hegemonic masculinity to describe how the tensions between tradition and modernity experienced by men are framed within a dominant but not uncontested or unchanging ideal of gender construction and relations in contemporary middle class India. As such I am taking Connell and Messerschmidt’s (2005) call to analyse hegemonic masculinity within its regional and local contexts and include the ways in which it is shaped and even contested by men and women who do not necessarily adhere to, yet are often complicit in supporting, the construct. In this section I will describe what hegemonic masculinity means in the context of the Indian IT sector and then I will explore how men construct, maintain, and resist hegemonic masculinity through discussion of homosociality, management practices at IT firms, and family obligations.

Though of course there are regional, religious, class and caste components which construct various masculinities which, in turn, are subject to change, some contemporary aspects of a hegemonic Indian masculinity can be sketched. In their exhaustive review of literature on south Asian masculinities, Osella and Osella continually return to the importance of marriage practices in shaping masculinity (2006). Although what, exactly, making a good marriage match and becoming a good husband entails is culturally specific, demonstrating the ability to support a family in moral and material terms is paramount in the construct of masculinity in India. However, the heterogeneity of Indian society complicates the notion of one, ultimate hegemonic form of masculinity. In their research on masculinities in Kerala, Osella and Osella found that rather than one hegemonic masculinity based on Brahminical ideals of detachment and another hegemonic masculinity based upon non-Brahmin (even anti-Brahmin) active engagement with
worldly matters, that attending to “dominant models or prestigious styles” of south Asian masculinities is a more appropriate and accurate approach (2006: 51). I take Osella and Osella’s point, but I would argue that the men and women who work in the Indian IT industry do create and adhere to a middle class hegemonic masculinity that is closer to what the Osellas identified as Brahminical ideals. This is likely because Brahmins are over represented in the middle class generally and the IT industry particularly (Fuller and Narasimhan 2014: 117). However, this particular manifestation of masculinity is based not upon the presence of Brahmins but on the national narrative of the IT workers as professional, middle class, and global. However it is also true that the Brahminic ideals of detachment and innate intellectual capability are wedded with a global engineering culture which privileges a version of masculinity based on rationality and technical prowess (Faulkner 2000) to define what professional behaviour for men and women entails. In sum, while it is not appropriate to claim there is one hegemonic masculinity in India, it is reasonable to use a frame of middle class masculinity as the standard by which men and women who work in the IT industry measure themselves.

An integral building block of masculinities in south Asia generally is homosociality and this is the case for the men and women who join the IT industry as well. Even accounting for variance amongst families, homosociality is the norm for young men and women from school through college or university. When men and women enter the IT workforce traditional gendered segregation present in many educational institutions is somewhat relaxed in that female engineers are integrated into project teams. Fuller and Narasimhan found that, among the emerging middle class of IT professionals in Chennai, a professional identity and work environment actually allowed for the relaxation of traditional gender segregations in the office (2007: 126). However, once one leaves the office, socialization gets more complicated, for women at least. Lakshmi, discussed above, told me that she never socialised with any male co-workers, explaining that when she was working at IT companies she was a strict vegetarian who didn't smoke or drink. On team outings she would end up standing alone not eating or drinking while her male co-workers were becoming friends. Another woman in her twenties who works at a large IT firm in Bangalore told me that she feels very uncomfortable if there is a work related group outing such as a lunch because, being the only woman on the team, she has to decide if she feels comfortable riding alone with a man on a two-wheeler or in a car with one or more men. Though she works with these men in a professional context she does not feel it is quite
respectable to ride with them en route to events. Even more off putting is after work socializing that includes drinking; drinking in mixed company, even in private is considered antithetical for middle class women in IT.\(^{43}\) Indeed, women’s anxiety about maintaining respectable femininity is one of the pillars upholding hegemonic masculinity in the IT industry, which makes sense because for a masculinity to be hegemonic, as opposed to just dominant, it must be supported as natural and even beneficial by women and men occupying different positions on the gender hierarchy (Connell and Messerschmidt 2005: 848).

While the difficulties of socializing outside of work for women have been well documented (Fuller and Narasimhan 2007: 133; 2014: 146; Radhakrishnan 2009: 209) for men, participation in extracurricular outings through or outside of work provides opportunities for relaxation, bonding, and networking. Examples of common group outings for IT professionals include going out for meals, drinks, to see films, or even away for beach holidays in Goa. One of my informants, Kabir who is in his early thirties and works for a MNC in Bangalore, has organised several motorbike road-trips with co-workers. He emphasized that men from all areas of his company join in so long as they are keen on long distance motor biking. He finds these trips so enjoyable that when I asked him what he liked best about his current job he said it was these trips. Such excursions – especially out of town trips but even to the cinema – are male-only social spaces where men can enjoy the fruits of their labour by spending their relatively high wages on consumption together. Importantly, these outings are usually amongst relatively young unmarried men of the same age and thus the outings offer a social space where they can fully relax together minus the surveillance of, or responsibility to, family or men of higher status. In his study of young middle class men trying to enter the IT industry in Bangalore, Nisbett found that friendships between age cohorts are integral to the social reproduction of professional middle class men in that they provide avenues for “…the circulation of capital (material, cultural, and symbolic); the articulation of moral discourse, and the negation of hierarchy” (2007: 948). Even though such friendship groups based on profession and class can minimize some forms of hierarchy such as caste and religion, allegiance to maintaining a middle class identity as IT professionals is subsumed under middle class masculinity and gender hierarchies are maintained.

\(^{43}\) In a year of fieldwork I never drank with female informants (though I did drink with other women a few times). That said drinking was not a common pastime for my male informants either and I rarely drank with male informants in private and only thrice in public.
Apart from opportunities for shared leisure, male bonding that takes place with friends from university or work also offer valuable networking opportunities. Many of my male informants told me that they had gotten jobs through their networks of male friends. A typical scenario recounted to me is that of a software engineer who is unemployed or no longer happy with their current job. A man in such a predicament will think about who they know in good companies and then reach out to ask if there are any openings. Similarly when a company is looking for new talent employees are often asked to think of anyone they know who might be a good fit. This kind of networking is not unique to men or the IT industry, but men in the Indian IT industry have access to larger social networks than women do and thus are better able to leverage such relationships for professional gain. We will now turn to the ways in which men both adhere to and resist management practices that support hegemonic masculinity.

The IT industry is well-known for demanding that employees commit substantial time and energy to employers and Indian IT firms are no exception. In the private sector expectations are that employees will work at least forty to fifty hours per week and more to meet crucial deadlines endemic to IT production cycles. While many firms are willing to accommodate married women with familial obligations as discussed above, this exception to the rule for women who enact respectable femininity speaks to the normative behaviour expected of employees whose familial obligations are not considered as significant: single women and all men. Long hours and stressful deadlines are an accepted aspect of IT work which is, everything being equal, perhaps the most sought after and prestigious route to the new middle class. The high salaries one can earn as a software engineer or project manager can support a middle class family, which for men especially is considered necessary for making a good marriage match and fulfilling societal expectations of successful manhood. Very few women are willing or able to put in the hours necessary to rise up in IT firms, whether due to sincere desire to spend adequate time with family or to a general distrust of women who are “too” ambitious.44 For men, however, the ideal scenario is to do what it takes to climb the corporate ladder. Though I did not meet any men who questioned their role to work outside the home I did meet several who are questioning the hegemonic narrative of masculinity in which their contribution to family life is solely through

44 According to a 2017 NASSCOM report, though women make up nearly 30% of the IT workforce they make up less than 1% of the “C suite” or corporate leadership: http://gsm-it.com/userassets/Publications/GSM-IT_SCORECARD-INDIA_Spring_2017_web.pdf accessed 5/8/2018.
working hard to provide material resources so that their children have access to quality education perceived as necessary for a good quality of life. However, just as with informants differing stances towards respectable femininity, the men I knew also approached hegemonic masculinity at different points along a spectrum. Below I will discuss two men and how they approach their obligations to marriage, family, and work.

I met Aziz, a 27 year old software engineer, at the Chennai LUG and we arranged to conduct an interview at his convenience. Aziz is tall, sports a moustache, and carries himself with confidence. He was one of the only Muslims I met at a FOSS event so I asked him if he felt his religion was ever an issue at work or in the wider tech community; he did not think so and he told me that being Muslim only meant that people often asked him for recommendations of good places to get biryani. During our interview he shared that he is somewhat ambivalent about progressing in the industry. He explained that the increases in salary are proportional to increased responsibility and he does not want to spend his whole life at work supporting a family he rarely spends time with: “If you earn money... you should have time to spend it, spend with family.”

While Aziz questions the level of commitment asked of men from the IT industry his views on women’s work and marriage are very traditional. He told me about his up-coming arranged marriage. His fiancé had just finished her degree in dental sciences but he has not yet decided if he will allow her to work. He said all this will be decided after the marriage, adding that he has not yet spoken to his fiancé; his parents worked with her family to sort out all the details, which he appreciates. He explained that nowadays arranged marriages can get called off if too much communication between the couple beforehand causes drama and he would rather do things the traditional way. He figures that if he could wait over 26 years to speak to his wife he can wait another six months until after the wedding. He emphasized that it is stressful as a man on the marriage market because bride’s families are looking for someone who makes a lot of money (often calculated in American dollars rather than Indian rupees) and that to get a good match you need to have an employment history with prestigious companies. Aziz’ concerns about making a good match and doing marriage right were echoed by many others I knew, both men and women.

Gopi, an active member of the Chennai FOSS scene introduced in Chapter Three, also questions the time commitments men are asked to make in support of but away from their families. Although he works full time and is a very active FOSS organiser, he values time away from work.
as well. His position as a technical architect for a start-up gives him a flexible schedule allowing him to balance his FOSS organizing and family life with work. Most men I spoke with, even if they were supportive of initiatives to include more women in FOSS, did not discuss the division of household labour. However, Gopi discussed his contributions to supporting his wife and son. In fact, when we sat down for an interview he brought his son along because his wife was busy. He also told me that the year prior he had arranged to work remotely so that while his wife was pursuing a degree in the UK he could join her and watch their son during the day while she was in class and do his work in the evenings when she was home. Although not many men I knew had supported their wives’ career to the extent Gopi has, his commitment to supporting his spouses’ goals was not isolated either. Men like Gopi are not necessarily representative of the industry but they are a significant minority who are actively choosing to live their lives in different ways that are self-generated and reflexive.

Technical Freedoms and Social Constraints: Women’s Work in the Indian FOSS Community
Although this section will focus on the experiences of women in the Indian FOSS community, it is important to note that, globally, it is estimated that less than 3% of all FOSS contributors identify as women.45 Given the ways in which hegemonic masculinity and respectable femininity shape gender in the Indian IT industry it is not surprising that many of the women I met have experienced difficulties while participating in the FOSS community. Indeed, Nitesh, who runs a technology focussed NGO in Bangalore, painted a bleak picture:

If you’re a girl child you have [to] first prevent getting killed, then you have to make sure that in university and school and at home you have access to the technology and that people don’t intimidate you from taking STEM courses and then once you come into the labour market there’s also bias against women... and then finally when you enter the free software movement it isn’t as if the men in the free software movement are trying to work on the gender divide.

As the above quote indicates, the barriers to entry and success in the Indian FOSS community are numerous. In the same interview, Nitesh, one of the few self-identified male feminists I met in India, emphasized that in India female participation in FOSS is quite low. This is not necessarily surprising, female participation in FOSS is low internationally. However, he

45 In a 2017 GitHub survey only 3% of respondents identified as female and while this survey may not be methodologically rigorous, the list of similar surveys and participation rates on projects and at conferences compiled by the GeekFeminismWiki bear out that women’s participation in FOSS generally is quite low: http://geekfeminism.wikia.com/wiki/FLOSS accessed 8/8/2018.
explained that in the Indian context there are several unique reasons for the relative absence of women in the community. Beginning with the “daughter deficit,” which results from abortion of female foetuses, in combination with entrenched patriarchy, which can result in female children not being given equal access to technology, if women do enter the FOSS community, they are often discouraged by unwanted attention and/or aggression from men. Even when men do not treat them with overt hostility, women’s contributions are commonly discounted as inadequate and their successes are treated as exceptional. That said, the Indian FOSS community also offers potential for resisting or redefining gender roles. In this section I will explore the space between the technical freedoms inherent to FOSS and the constraints inherent to middle class gender relations through discussion of women’s labour, ideas of merit, the gender and technology slot, and strategies employed to make FOSS a friendlier space for women.

**Women’s Labour: Free as in Freedom or free as in Beer?**

In September 2016 Sam, who helps organise the ILUGC meetings I attended monthly, invited me to visit him at his job so I could see how he has utilised FOSS. Sam runs the IT department at a hospital with Uma, who is just below him in seniority. Together, Sam and Uma devise, implement, and maintain all the IT needed to run a large hospital. I knew Sam from the ILUGC meetings so during their joint interview I asked Uma if she was also active in the FOSS community. She replied that she only sees the emails from various FOSS listservs and then Sam interjected: “I can go because she is here. I am able to roam around because she is here, right? Otherwise you know our set up, we cannot, this is a 24 by 7 support… so [because] she is there only I am able to do that, that is her contribution… so that’s her role, hidden role. But very, very critical.” Later I asked them what their interests are outside of FOSS. Sam told me that in addition to evangelising FOSS he volunteers reading and writing Tamil inscriptions at temples. Uma explained that she does not have any free time for community activities because when she is not working full time she has many family responsibilities. She takes care of her husband and her son, who is 23 with an engineering degree and about to start a job. In addition, her in-laws live with her so she has a lot to take care of at home. At this point in the interview Sam again interjected “That itself is her service.”

46 It is important to note, however, that there is significant regional variance with regard to gender specific child rearing practices, with south India being generally more female friendly. Further, among the middle class families I was acquainted with, access to education and technology was actively encouraged for all children regardless of gender. https://www.idrc.ca/sites/default/files/sp/Documents%20EN/the-daughter-deficit-india.pdf accessed 7/12/2017.
By sharing this conversation I am not trying to suggest that Uma’s “hidden role” which allows Sam to actively participate in the FOSS community is somehow problematic for Uma. I certainly did not get that impression; Uma indicated she is very happy to participate in FOSS at the level she is – by using it at home and work and providing cover at work so that Sam can participate in public spaces. I am presenting this dynamic because I think it so clearly embodies the interplay between hegemonic masculinity and respectable femininity. Sam and Uma, both in their early fifties, represent the first generation of middle class Indians in which many women joined the IT sector and as such it is not surprising that they seem to wholeheartedly embrace respectable femininity that allows professional women to experience what Radhakrishnan (2009: 207) calls “the ‘right’ amount of freedom;” i.e. to enjoy work and still prioritise traditional family obligations. Throughout the interview they praised each other’s abilities and obviously respected each other’s contributions at work and at home. Although Uma is content to engage with FOSS through supporting Sam’s time away from the office, for women who are interested in more active participation in the FOSS community such traditional gender roles can be a hindrance. This is especially the case in the FOSS community because so much of participating in FOSS occurs not in professional offices, which fit easily into the schema of respectable femininity, but in male dominated social spaces such as LUGs, conferences, and online forums. What I would like to focus on are the implications of how women’s labour is utilised within the FOSS community and what that says about limits of the FOSS philosophy as an embodied ideal.

Behind the scenes contributions such as Uma’s which enable the functioning of public and private entities – in this case the FOSS community and the family – easily fit into what is referred to as “invisible work” often performed by women in support of men in private or professional spheres. While one of the characteristics attributed to invisible work is that it is necessarily undervalued (Hatton 2017) I would argue that in the case of women who enact respectable femininity that their “hidden” contributions are valued precisely because they uphold hegemonic masculine values in which women should put family first. However, even if work women do to enable men in the FOSS community is valued, it does problematize the rhetoric espoused by many in the community about freedom and openness as guiding principles. Although technical transparency is taken as a starting position, most FOSS activists would argue that social and political transparency are just as important. Therefore, the lack of transparency
when it comes to women’s inviable contributions within the FOSS community suggests inconsistency between theory and practice.

Because FOSS is often free of cost the distinction between the different meanings of freedom is emphasized by the FOSS community to emphasize that FOSS is “libre not gratis” or means “free as in freedom not free as in beer.” The FOSS philosophy is embraced by many in the community, especially those who would consider themselves free software activists, as an ethical position with implications for all areas of life. Many men told me that within the FOSS community questioning traditional hierarchies is an important aspect of their mission. However, highlighting how women’s contributions are often labour that allows men the time to participate in the FOSS community complicates claims of an ethos of openness and freedom for everyone. While men are embracing freedom as a philosophical ideal, women are providing invisible labour at home, work, and even within the community and thus their contributions are free in a material sense. By putting in time at work or home so that men have free time, women are reproducing traditional divisions of labour in which men’s time is more valued. Many women, like Uma, prefer this arrangement because they sincerely wish to devote their time to their families.

**Merit and Other Obfuscations**

Despite the barriers to entry discussed at the beginning of this section many women who are introduced to FOSS, usually in college or university, do join the community. Yet, within India and the wider FOSS community many women do not find the FOSS community welcoming or comfortable, despite the community being founded, in part, on an ideal of technical meritocracy in which merit is defined by the technical quality contributions and nothing else (Coleman 2012: 121). The discourse of technical merit is used to deflect criticism of the relative lack of diversity in FOSS – view the comments section of any article about issues of gender in FOSS online for a lesson on how members of the community do not see race or gender, only good or bad code.\(^\text{47}\) Despite a prevalence of men who make public claims that good code is all that matters for membership and acclaim within the community many women who have entered the community have faced gender based discrimination. A 2016 study found that found when the gender of the contributor was removed from code submissions on GitHub women’s code was generally

\(^{47}\) The comments to this 2009 editorial on sexism in FOSS are indicative of the kinds of arguments men make about women needing to prove themselves and toughen up if they want to be a part of the community: [https://www.linuxtoday.com/infrastructure/2009091803235OPCY](https://www.linuxtoday.com/infrastructure/2009091803235OPCY) accessed 8/8/2018.
accepted at a higher rate than men’s, even though it made up a small proportion of all submissions but that when the gender of the contributor was made visible the same code was disproportionately rated lower (Terrell et al. 2016). Gender based discrimination is not limited to technical contributions; it is also experienced in the social spaces – both virtual and physical – where the FOSS community meets. Below I will sketch out some of the ways in which ideas of technical merit are used to marginalize not only women but non-technical contributors in the Indian FOSS community.

When I first asked Priti, a recent college graduate who is active as a contributor and evangeliser, if she felt the Indian FOSS community was welcoming to women she said it definitely was but later in our interview when I asked what she thought was unique about FOSS in India she said that she found her work was often discounted, explaining:

What I have experienced here is when you are... submitting your code patches or you’re trying to be part of a community... what really happens is... they will help you, they will welcome you. But when it comes to handing out responsibilities they would think twice because you are a woman. I haven’t seen that kind of situation when you’re working on an international project where people from all over the world are involved... there they are all like you think you can handle this? OK, go ahead. They won’t see your gender, they’re not going to judge you based on that. Here, it’s not the case. Here I have experienced it a couple of times that... they would question. I’m not sure if it was because I was a student or I’m a you know girl. But, yeah they have asked quite a lot of times do you really think you can do that? ...Maybe someone else? And that someone else is most of the time a man.

Although there is a lot of evidence that, internationally, women in FOSS are subject to discrimination ranging from lowered expectations to threats, her point that in the cultural context she knows best she has been discriminated against is well taken. When asked what she has done in these situations she said her strategy is to work twice as hard to prove herself. For example, if something was expected in two days she would deliver it in a few hours. She added that in her experience in the community men do not have to prove themselves like women do.

Another way work in FOSS is discounted is through the “brogrammer” mantra “show me the code,” which implies that code and only code is the only measure of merit within the community. This attitude is not very welcoming to newcomers, especially women who may already be

uncomfortable in the male dominated field. Nitesh, the NGO director mentioned at the start of the section, told me that he has heard stories of women who assume male names for online forums and also that men who have gender ambiguous names have been harassed. He then explained how the “show me the code” ethos discounts his contributions as well: “The problem with show me the code is many other contributions to the free software movement are not accepted or given adequate respect.” He gave an example of how in 2003 he had six students who were Burmese refugees whom he had spent six months training in Python. Now one of them runs a large project in Myanmar. The problem, according to him, was that the markers for contribution to free software does not include such work, only code counts. He himself doesn’t have any code contribution, so by that measure he is not deemed a contributor. However, he pointed out that if you look at all that he has contributed indirectly by training people on free software and promoting it to government and education his impact may be greater than that of the average code contributor.

The Gender and Technology Slot
As my fieldwork was coming to an end I was invited to help the Free Software Foundation of Tamil Nadu (FSFTN) prepare for the 4C Conference, a national free software conference held in Chennai (discussed in Chapter Two). I had been in touch with and meeting with members of the FSFTN and their affiliates in the FSMK for months and had offered to help in any way required, citing my experience in event management and willingness to do general work around the office. The weekend before the conference I headed to the FSFTN headquarters, an apartment in central Chennai that has been converted into an office. There I met with a group of young men who are all FSFTN volunteers. I spent over an hour just hanging out with the volunteers, eating some lunch and chatting about their work. After a while I was told to shift over to the nearby flat of an FSFTN organiser where some of the planning was taking place. When I arrived at the flat everyone was working frantically to prepare for the conference so I asked my main contact how best I could help. He said that there was a group of women who had thought it would be good to do a workshop on issues women in FOSS face and I could help them organise that.

I sat on the floor with two women, both from Bangalore and in their twenties, and we talked about what they wanted to accomplish. We also talked about their experiences of gender discrimination. One of the young women, who is still a college student, told us that men she takes classes with relish in calling women “bitches” and feign ignorance that women may find
this offensive, saying they are just joking. They both reiterated that they were fortunate that their parents let them participate in extra-curricular activities such as FOSS activism because many of their female classmates would not be allowed to go out of town for conferences. Since they were visiting from Bangalore and there were wide-scale public pro-Tamil culture protests\(^49\) happening in Chennai while they were visiting they decided to go down to Marina Beach, a famous public landmark and largest site of the protests, to see what it was all about but they were discouraged when they heard men in the crowd chanting that women should wear saris.

After discussing some of the issues they have dealt with we agreed that since we imagined only women already in tech would participate in the workshop we need not go over the barriers inherent to the community: they know. We decided to focus on what would have been useful for them to have known before they entered the community, as well as sharing and developing strategies for dealing with gender based discrimination.\(^50\) To that end we devised several common scenarios of covert and overt gender discrimination. Examples included how to confront men who question your ability and/or do not assign responsibility you can manage, and what to do if a man makes an unwanted advance. Though we sketched out some tentative strategies the session was designed to include role-playing and brainstorming.

When I got home I mused at the fact that the issues women face in IT generally and FOSS specifically are only discussed and worked on by women, adding yet more work for themselves. I am certainly not the first person to make this observation but I was struck by the automatic assumption that my contribution should be to a ‘women in technology’ session. The gender and technology slot, as I call it, encompasses all the research and initiatives done by and for women aimed at assessment of participation and amelioration of discrimination; in other words work done to shed light on the number of women in technology and the quality of their experiences. While this work needs to be done, the fact that most men in the FOSS and allied communities see the work as women’s responsibility underscores the power of hegemonic masculinity. Science and technology conferences endeavour to ensure the “gender” issue in which gender is

\(^49\) The state wide spontaneous student protests were in reaction to the Supreme Court banning of Jalikattu, a traditional Tamil bull taming sport, because it was considered animal cruelty. However the protests morphed into more generalized pro-Tamil culture rallies in which affiliated demands of banning Pepsi and Coca Cola were also made so that the water used to make these products could be used by the state’s suffering farmers. In late January 2017 the Tamil Nadu government bypassed the federal ruling and made Jalikattu legal again.

synonymous with women is at least formally addressed. However, since this inclusion of sessions to address the issues women in technology face, though presumably well intended, is usually a box ticking exercise in that the prevalence of “manels” in which no women are present is still the norm at many conferences. In fact, data scientist Monica Rigoti has suggested that the Bechdel Test be used at tech conferences to see whether they have: 1) two women speaking, 2) on the same panel, 3) not about women in tech. Sessions such as the one described above created by and for women have limited utility as most of the women who create and attend such sessions are well aware of the pertinent issues. As it turns out, according to one of the women who ran the session, it was not especially impactful for the few women who attended.

During the planning for the session I had suggested to the FSFTN activist who asked me to work on this that perhaps it was not women who need to know about and work on these issues but men and he gave a non-committal response. While some men in the Indian FOSS community are certainly doing their part to make the community more inclusive, many, even those who generally support women’s empowerment, assume that it is women’s responsibility to empower themselves within the community, thus reproducing hegemonic gender norms which place no responsibility on men for how women experience male dominated communities. Although I am discussing an instance of how the gendered inequality is reproduced in so called efforts to address it in the FOSS community, such reproduction of inequalities within social movements are both complex and common (e.g. George 2003).

Strategies for change
That there are structural and social barriers to women’s full participation in the Indian FOSS community is evident. What is less clear is how best to ameliorate the situation. In this section I will discuss some strategies men and women are pursuing in efforts to increase and improve women’s presence in the Indian FOSS community. Although not exhaustive I will highlight the experience of three interviewees, Rashmi, Kumar, and Lakshmi and the groups they have joined or formed to fight gendered discrimination in the Indian FOSS community.


52 I was unable to attend the session due to a scheduling conflict. The students from the Ambedkar Community Computer Centre discussed in Chapter Four had travelled to Chennai and wanted me to attend a performance they put on of original dances and plays which, unfortunately, was at the exact same time as the Women in Technology session.
Rashmi, in her mid-twenties, works on several FOSS projects in addition to her full time job in the Bangalore office of an MNC. She credits her ability to recognise and resist gender based discrimination to a competitive internship she did with the GNOME Foundation. The GNOME Foundation oversees the GNOME project, a free software desktop interface. Significantly, this internship was only open to women and paid $5000 US. Rashmi did not get into the programme the first time she applied so she continued contributing and was accepted the second time and even got to attend a conference in Prague. She didn’t apply for an internship at Google Summer of Code because it felt too intimidating but this internship with just women felt more approachable.

During the internship Rashmi chose to focus on documentation instead of coding because she thought it would be easiest. She is a little ashamed of that now but at the time she felt intimidated by the free software community. However, once she joined the project she found that the other women involved were not unapproachable geniuses but quite “normal,” i.e. people she could relate to, which she found “empowering.” She also learned a lot about issues faced by women and people of colour in FOSS. She does not have many female friends she could talk to about tech whereas men can talk about tech with each other quite easily. She speculated that not feeling you can talk to people like you about tech may be a reason so many women do not get into it.

Despite having attended ‘women in technology’ conferences she said she “didn’t get it” when women would “rant” about discrimination. This all changed when she began working. She is not sure if she did not notice discrimination at university because it was not an issue or because she just did not notice it. Once she started working she noticed very subtle examples of unconscious bias. An example she gave would be of working on a project and a man saying in a surprised tone, “Oh wow, you did that?! You’re so smart!” Sometimes she feels insecure about her abilities and this manifests by way of going into her shell whereas she feels men who are insecure will try and control the situation. However she has learned to confront her insecurities in her current job because it is a supportive environment. She told me that, for example, she took initiative on a project during non-working hours and someone asked why, implying she should not have done so. She stood up for herself, arguing there was no reason not to do extra work if it does not affect her tasks during working hours. Some co-workers supported her and she said that
is what makes a difference, as a woman, during a confrontation because there is a fear that everyone will think you are “crazy.”

Rashmi’s experience as a paid intern for a prestigious FOSS project exposed her to the reality and subtlety of gender discrimination but also gave her role models of “normal” women she could relate to who can be successful to model her own career off of. It is significant that she not only applied to the internship because it was restricted to women, but also that she chose to do documentation work, which is necessary and important but under-valued because it is not coding. That she feels bad for doubting her technical ability signifies that she has learned not to downplay her capabilities due to gender. That documentation is considered easier and thus more appropriate for project beginners and implicitly women deserves further exploration. It is significant that the GNOME Foundation sponsors opportunities that appeal to women like Rashmi. This project is somewhat unique in that it positions itself as welcoming to new contributors – as evidenced by the ‘Get Involved’ portion of their website which shows a woman of colour working at a computer and reads “GNOME is a friendly and welcoming community. Getting involved is a great way to learn skills, have fun, and help to create world-class Free Software.”

Another, local level project working to get more women involved in free software is run out of Space Kerala, an NGO in Trivandrum. Kumar, who helps run SPACE Kerala and was one of the organisers for the IT@school project joked that he and the other free software activists were often called “free software terrorists” but that he needs a stronger term than terrorist to describe the women teachers he worked with. He then explained how the ICT@school project, in addition to addressing the digital divide had also addressed the gender divide with ICT, which was not part of the original design. When the Kerala government mandated that all teachers become IT literate a system was set up in which Master Teacher Trainers were selected from each region who, after training on Linux, were responsible for training the teachers in their districts. Since over 50% of all school teachers in Kerala are women it just so happened that a large proportion of the Master Trainers were women and their skill and resourcefulness became a source of pride and respect even from male teachers. However, female teachers were also subject to gendered

constraints and family tensions when their responsibilities regularly took them away from familial responsibilities (Arun 2013).

Kumar told me that by showing how this “accidental” gender parity in IT access occurred in the IT@school project through writing about it on their website and in academic papers it was hoped that might help other organisations achieve similar outcomes. He added that: “at core we [SPACE Kerala] are political so we are concerned about all kind of power relations and we are ready to challenge them. So whether it is in software or in gender, wherever possible we will raise that issue.” For the past two years SPACE Kerala has been running a woman focussed free software training program. So far more than 250 women have participated in workshops. The workshops are held for undergraduate engineering students and are about free software and privacy issues. He explained that at the engineering schools the computer facilities are not accessible to female students after 6:30pm. He attributed this rule to a paternalistic view of their safety is compromised if they are in the facilities at night with male students, who do get access. As such women only training classes are intended to offer a structural solution to the structural barriers female students encounter.

A common strategy for dealing with gender discrimination is to create women only user groups. Lakshmi started Pyladies Bangalore in July 2013 after she realised that waiting for replies from online forums or the Bangalore Python user group meant that women expended more energy to figure things out than men because most men could just pick up the phone and call a peer whereas women who work in tech do not have the same kind of social and professional networks. When Lakshmi started the group she made the decision to have online meet-ups rather than in person meetings. When I asked why she said that there is a very active Python user group meet up in Bangalore but that while there were well over a thousand men in the group she counted about 20-30 women and, of those, 9-10 were not technical but in HR. She never went to one of their meet-ups because they are held on Saturdays in Electronic City or another IT park, all of which would take several hours to reach on public transportation (the three to four buses needed to get there, in bad traffic, would take around four hours). Lakshmi explained that rarely do women have free time outside of work to pursue their interests so holding the meetings online but in real time was a practical workaround. During online Pylady meetings about 30 women usually participate and for the few in person events she’s organised about eight or nine women
have attended. At the meet ups Lakshmi gives tutorials on the basics of coding in Python. She is also working on lessons for more advanced issues but hasn’t started sharing those yet. Lakshmi is in touch with some women involved with Pyladies throughout India and said this is the most connection she has found in the tech world.

In addition to the examples discussed there are many other initiatives aimed at helping women including LinuxChix India\(^{54}\) and Swift Women in Free Technologies\(^{55}\) (SWIFT), both of which provide virtual support networks and participate in the wider Indian FOSS community. Initiative such as the ones described above differ with regard to organisation and scale but they all focus on giving women opportunities to work in social spaces where women predominate. The social spaces of the Indian FOSS community are almost exclusively male (for example LUGs) so participation can be intimidating for women, especially young women, who often end up as the only woman in a room or on a project. While on the one hand emphasising homosociality among women in FOSS can reproduce more general gendered segregation, these initiatives do provide opportunities for women to enter the community comfortably. While the impact of such strategies is yet to be assessed the fact that some of my informants have been able to use the inspiration and support they gained in such groups to their professional advantage is promising.

**Conclusion**

This chapter contributes to the sizeable body of literature on gender and technology. While most of this literature focuses on the West, the ways in which gender informs the IT industry generally and the FOSS community specifically in India are unique. This uniqueness is not patriarchy as such; patriarchy is just as prevalent in most parts of the world. While low participation of women in FOSS is a worldwide issue, within India it has played out in particular ways which have to do with how male and female roles at home, work, and in public are conceived. While most people are more or less happy to accept the roles ascribed to them by their gender like Sam and Uma, some challenge this openly, like Lakshmi and Gopi, while others do so in ways that are more accommodating of the hegemonic masculinity model like Arivindha and Aziz.

Throughout India’s inception and growth respectable femininity, which is a refraction of hegemonic masculinity, has provided women with the “right amount of freedom” to participate

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55. [https://swift.fsftn.org/blog/](https://swift.fsftn.org/blog/) accessed 8/8/2018.
in the lucrative but, importantly, professional IT industry so long as their essential identity as wives and mothers was not impacted (Radhakrishnan 2009). Indeed, even today dependence on a male family member for material support is assumed to the extent that when filling out bureaucratic forms (such as at the doctor’s office) a woman must enter the name of her father or husband; there is no space for a single adult woman to exist in an official capacity untethered to a man. However, the degree to which patriarchy is institutionalized is not the most significant difference between how professional women in India navigate the IT industry and FOSS. One striking difference between the Indian and Western IT industry and FOSS community is that whereas in the West it is often presumed that women do not participate in the industry because they are not naturally endowed with maths and science ability (Faulkner 2000), in India this is not so (Fuller and Narasimhan 2014: 146). Women’s exclusion and discrimination in the Indian FOSS community, then, is rooted in a different set of gendered assumptions and priorities. Chief among these is that much of the work of the Indian FOSS community – evangelising – is done in public, social settings and many women do not have as much free time away from work and family obligations as men do. Further, due to prevalence of homosociality, many women and men do not necessarily feel comfortable working and socializing together in the public sphere. Another pernicious barrier to women’s participation in the FOSS community comes, ironically, from efforts to address the gender gap in ways that make addressing issues of discrimination solely women’s work through the promotion of events and panels developed, produced, and attended mainly by women who are already very aware of the issues. However, there are men and women who are working to create spaces within the Indian FOSS community for women to enter, grow, and thrive in counter hegemonic ways.
Chapter 6 – Developers and Development: The Political Economy of FOSS in India

Introduction
One of the key features of FOSS in India has been the pragmatic acknowledgement that, as one informant put it, “free as in beer counts!” Certainly there are other pragmatic reasons for Indian organisations to use FOSS but the fact that it saves money is significant for any government, especially in a developing nation, as the United Nations flagged in 2003. Yet, I was told that despite a now official pro-FOSS policy at the national level, the Indian government does not take full advantage of FOSS. To better understand why that is, we need to understand the complex and often changing relationships between government, industry, and NGOs.

Time and again when I asked members of the Indian FOSS community for their thoughts on the government’s FOSS policies they would say something along the lines of ‘anytime the government makes a pro FOSS statement, Bill Gates donates money to some hospital.’ The implication of such statements being that Bill Gates was using his role in his philanthropic organisation, The Bill and Melinda Gates Foundation, to pressure the Indian government to back off any policy that might lessen their contracts with the company he founded, Microsoft. It is unlikely that Bill Gates himself asked for a quid pro quo deal wherein aid is bestowed and Microsoft contracts are signed. However, the twinned interests of Microsoft and Gates Foundation cannot be ignored as they both push a neoliberal vision of development.

So far I have discussed FOSS as it relates to three kinds of development: as the process of developing software applications and systems, as personal development or practice with ethical implications, and as small scale community work, or “development with a small d.” This chapter will more directly explore the relationships between software engineers (sometimes referred to as developers) and socio-economic development. I will explore how the Indian IT sector fits into national development goals more broadly through discussion of theories and practice of information and communication technology for Development (ICTD) and the digital divide before discussing the ways in which the Indian FOSS community echoes and critiques ICT for development practices. Next I will examine government policies as they relate to software procurement and use as well as the extent to which these policies are put into practice, or the gap between FOSS’s potential and its practice in India. I will also discuss the hurdles to FOSS
adoption for the Indian IT industry. Finally, I will address the roles NGOs play in the underutilization of FOSS and the efforts of some to address these structural barriers to FOSS adoption.

Technology and Development in India
In his review of the theoretical underpinnings of development studies, Bernstein (2006) shows how the idea of development has been used to ameliorate the consequences of capitalism (and colonialism) with efforts to lesson poverty and modernize “backward” regions so as to bring developing nations into supposedly mutually beneficial economic relationships with dominant Western nations. Bernstein notes that several scholars conceive of development as “social engineering,” a term which is more literal and appropriate than perhaps intended. On the one hand, development goals are often implicitly tied to a social engineering that involves creating and maintaining members of the global market, which seeks continual growth through ever more producers and consumers. The development of new (emerging) markets which produce both pools of new cheap labour and a new and growing consumer base requires ‘engineering’ of social life so that modes of production are changed and people are brought into the labour and consumption markets. In addition to these sociocultural changes infrastructural changes are needed for modernization and, in theory at least, equitable access to material goods and services. To that end, the material-heavy components of development schemes involve literal engineering to create the technical infrastructures needed to deliver resources such as water, electricity, and information technologies. In this section I will discuss ICT for Development and the digital divide in India as well as how the Indian FOSS community endeavours to use FOSS to contribute to national development.

ICT for Development & the Digital Divide in India
Meeting at the convergence of economics, development, and various technological disciplines, Information Communication Technology for Development (ICTD) is a sub-discipline which aims to analyse how technologies can be mobilised to improve socio-economic development in lesser developed regions and countries. As Avgerou (2010) makes clear, no matter if the focus of ICTD research is based on a technical, economic, or traditional development framework, there is an inherent and usually unstated assumption that technology inputs to lesser developed communities will be unambiguously beneficial to those communities. This observation can be understood as an extension of critiques of development economics which prioritize economic
growth as measured by real GDP. For example, Pushpangadan and Balasubramanyam argue that although economic growth may be necessary for development, in India at least, it is certainly not sufficient (2012: xviii). Agerou goes on to show that although the majority of ICTD research does not engage with what, exactly, development is or should be, that there is an explicit assumption that when it comes to ICT innovations, developing nations are at a distinct disadvantage. This disadvantage is conceptualized as the “digital divide” (2010: 2-3). Further, she contends that “Such research, too, tends to make the assumption that technological and institutional trends are set elsewhere, and that available ICT artefacts, as well as, business models deemed necessary for their use, may not be meeting developing countries’ needs” (2010: 3). The case of India, which in addition to uneven development has well established institutional infrastructure and a strong IT sector, complicates these assumptions. In this section I will provide an overview of how the IT sector fits into Indian development goals and realities.

When India is described as having uneven development what is meant is that although there are fully ‘modern’ cities and institutions enabling millions of citizens to live middle-class lifestyles with access to all necessary amenities as well as cutting-edge technologies, many hundreds of millions more are still living at or below the poverty level.  Although the percentage of Indians living in poverty has decreased over the decades, India is still “home to one third of the world’s poor.” In addition to strictly economic indicators, the most recent national census in 2011 shows that, nationwide, the literacy rate is 74%, a 9% increase from the 2001 census, however there are also significant geographic and gender differences that need to be acknowledged.

Indeed, all of the indicators of unevenness in India – income, education, health, access to toilets, water, and electricity – have regional, urban/rural, gender, caste, religious, and ethnic dimensions. Although access to food, water, toilets, healthcare and education are arguably more pressing concerns than access to ICT, access to ICT is seen by many concerned with development in India as crucial nonetheless. This reasoning, at least in part, can be traced to India’s ‘leap-frogging’

56 The poverty level is defined by purchasing power parity (PPP) of X money, usually US dollars, per day. Different agencies and governments use different PPPs but even with different definitions and weighting of variables it is clear that many hundreds of millions of Indians are living at or below the poverty level, whether it is the World Bank’s $1.90 per day or the Rangarajan panel’s Rs 47 per day in cities/Rs 31 per day in rural areas. Rangarajan panel poverty estimates: https://www.indiatoday.in/india/north/story/rangarajan-panel-report-poverty-line-suresh-tendulkar-committee-199551-2014-07-07#close-overlay accessed 20/6/2018. General discussion on poverty levels in India: https://en.wikipedia.org/wiki/Poverty_in_India#2010s accessed 20/6/2018.


from a primarily agriculturally based economy into a ‘post-industrial’ economy in which ICT based services make up the majority of the GDP, skipping over a phase dominated by a primarily industrially based economy.\(^{59}\) Making up nearly half of the nation’s GDP, ICT based services are seen as the most promising avenue for employment compared with agriculture or manufacturing, hence exposing more and more people to these technologies is considered paramount for ensuring more people from disadvantaged backgrounds are able to participate in profitable employment. However, bridging the digital divide in India is no easy feat.

Accurate figures for digital access and literacy in India are hard to pin down and verify. Using a combination of government statistics, along with industry and news reports, it is possible to ascertain that (plus or minus a few percentage points) India is ranked second globally behind China when it comes to sheer number of computer and smartphone users. However, considering the size of the population, these numbers can be misleading when it comes to digital access and literacy rates. Boasting the second highest number of smartphone users globally at over 220 million, still only 30% of citizens have access to these devices.\(^{60}\) Similarly, when it comes to computer and internet access, Pew Research found that in 2015 a total of 22% of Indians have access to the Internet at least occasionally but that those with the most access were younger and had higher levels of education and income.\(^{61}\)

As discussed in Chapter Two, the rise of the Indian IT industry has been hailed internally and internationally as a rising tide that can lift all boats. Yet, as it stands, the outsourcing based IT industry is unlikely to provide socio-economic opportunities, even indirectly, to many who are not already in the middle class. Although the IT services industry contributes much to the GDP, according to the 2011 census 70% of Indians are still living in rural areas\(^{62}\) meaning that although the IT sector has leapfrogged past a substantial industrial phase, a majority of Indians

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\(^{59}\) For a detailed analysis of India’s economy from 1971 through 2018 that demonstrates the rates different sectors of the economy have grown please refer to the India Development Update: India’s Growth Story released by the World Bank in March 2018. Of especial relevance to this discussion of total factor productivity (TFP) gains from the IT services sector: “...India’s growth since 1980 was fueled by a rapid expansion of TFP in services. In contrast to the service sector, productivity increases in Indian agriculture were modest, and industrial growth relied on employment increases and experienced comparatively low TFP gains” (Gupta 2018: 21).


have not been able to take advantage of this. According to D’Costa (2011: 244) the Indian IT sector directly employed just two million people in 2008, noting that this represents less than 1% of the labour force. He further argues that the IT industry does not provide for a substantial “ripple effect,” with indirect employment, concluding:

Export orientation, technical education and market reliance are seen as the building blocks of a ‘new’ India without acknowledging that India is still an impoverished agrarian society, whose development imperatives demand domestic development, high-quality universal education and the provision of state-led infrastructure and other public goods. ...the [ICT] industry is incapable of generating high employment growth and technical education requirements limit access to education for disadvantaged groups, which in turn reproduces inequality (2011: 247).

Despite the unrealistic goal of using IT to bring hundreds of millions of citizens into the industry, access to ICTs can be a development goal even if employment in the IT industry is not considered likely. For example, numerous projects focus on equipping local communities, governments and NGOs with ICTs in an effort to streamline and improve the work they do on behalf of the disadvantaged. However, Walshum’s (2010: 16) review of ICTD in India, using Amartya Sen’s freedom-building capacity as a frame, found that despite some promising initiatives, that the vast majority of beneficiaries of ICTD projects in India were those who were already relatively well-off such as land owners from richer states; that ICTD projects are not easily scaled-up to benefit wider populations; and, finally, that inserting technology into socio-economic systems does not necessarily make a difference if institutional issues (such as corruption) are not simultaneously changed.

**FOSS for Development**

As stressed throughout this thesis, many in the Indian FOSS community see this technology as an explicitly political and economic tool for nation building. It is not at all surprising, then, that several of my informants are involved with development projects which are designed around or incorporate FOSS. Many of my informants agreed with the somewhat dire prognosis of the ICTD agenda as described above. However, FOSS activists argue that the problems inherent to the ICTD approach can be resolved by using FOSS for development projects because both access to technology and the uneven socio-economic system are addressed simultaneously. Indeed there is a whole sub-section of ICTD literature that specifically addresses the implications of FOSS in the development context (Hoe et al. 2006; Schmidbauer, Gençer, and Tunalio ğlu 2007; Sowe, Parayil, and Sunami 2012). The arguments made by this literature and my informants for use of
FOSS as a development tool are rooted in economic and technical logics which have political and moral implications. Further, many feel that the organisation of the free software community engenders equality for its members and those whom they wish to help via FOSS. Of course, as sound as many of the pro-FOSS for ICTD arguments are it is important to consider that some in the FOSS community do not acknowledge the unevenness of the community itself (for example, the class, caste, and gender hierarchies discussed in Chapters Four and Five). However, many of my informants also recognise that technology alone, even FOSS, is not enough; for example, the volunteers at the Ambedkar Community Computing Centre discussed in Chapter Four encourage the kids to sing and dance as much as they encourage them to learn how to operate computers. To better understand how the Indian FOSS community’s approach to development reflects and departs from ICTD I will draw upon case studies and interviews with FOSS activists about how FOSS is or should be deployed to even out India’s development.

FOSS activists often emphasize that the “free” in free software refers to the four freedoms (to see, use, modify, and distribute code) and that to interpret the low or no cost of FOSS as “free as in beer” misses the point. Certainly the technical merits of FOSS are reason enough for industry and government to adopt it: FOSS offers high quality, less virus prone, and more secure software solutions. That said, one of the main arguments for choosing FOSS in a developing country is that it is low or no cost. Indeed, as discussed in Chapter Three, one long-time activist from Kerala referred to this as the “fifth freedom” in his pragmatic argument for India to take advantage not just of the technical advantages inherent to FOSS but to save limited financial resources. De’s (2009) findings that the economic impact potential for public and private organisations in India to switch to mainly FOSS based products could bring annual savings upwards of two billion in US dollars certainly adds to pragmatic arguments. In an effort to assess the economic as well as the technical merits of FOSS for development in India in Table 6.1 I have synthesised the ICTD issues brought up by the literature and my informants and listed the attributes of proprietary versus free software solutions.
<table>
<thead>
<tr>
<th>ICTD Issue</th>
<th>Proprietary Software</th>
<th>FOSS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>Licence often donated for NGO projects but not for Gov or Industry, licence fees can take money away from ICTD goal</td>
<td>Licence low or no cost</td>
</tr>
<tr>
<td>IT help/maintenance</td>
<td>Dependant on vendor</td>
<td>Dependant on trained staff or FOSS community</td>
</tr>
<tr>
<td>Language</td>
<td>Microsoft products available in 12 Indic languages; will not create new languages unless market driven</td>
<td>Libre Office available in 17 Indic languages; FOSS inherently customizable but dependent on community</td>
</tr>
<tr>
<td>Hardware compatibility</td>
<td>Newer versions often crash on older hardware</td>
<td>Linux can be easily configured to run on old hardware</td>
</tr>
<tr>
<td>Internet connection</td>
<td>Internet and WIFI connectivity via ISP can be costly and difficult to maintain in rural areas</td>
<td>Mesh networks do not rely on costly/complicated ISP infrastructure &amp; are easy to maintain in rural areas</td>
</tr>
</tbody>
</table>

Table 6.1 Comparison of Proprietary Software and FOSS for Development in India

The benefits of the low to no cost of FOSS to individuals and organisations are fairly straightforward, especially from an import substitution argument wherein a developing nation with limited resources can potentially save billions on licence fees while simultaneously nurturing home-grown talent and industry. There are also many technical benefits of utilizing FOSS for development projects. Two examples I came across which exemplify FOSS’s ICTD potential in India from a technical perspective are software packages for the disabled and mesh networks.

There have been several projects which incorporate FOSS to create text readers for the blind and visually impaired. Very basically a text reader is an application that reads aloud text on the screen and/or describes images. Nitesh, the director of a Bangalore based NGO told me about one free software project they worked on to provided screen readers for the blind. There is a well-known proprietary software called JAWS that costs $1,000 US per licence and comes in English and Hindi versions. The NGO got a grant of $300,000 US from the Hunts Foundation which they used to create support for 12 Indian languages in a FOSS text to speech engine called E-speak and they also fixed about 20-25 bugs in a FOSS screen reader called NVDA. By using the money to modify existing FOSS applications they were able to provide access to many more blind...
people in India than if they had purchased 300 licences at $1,000 each. Nitesh told me this was important because it was a more impactful use of donor money and also because by using FOSS they were able to deal with a market failure in that some of the language communities are considered too small for proprietary companies to make a profit catering to. By providing these communities with technology in their native tongues the digital divide is addressed and linguistic sovereignty is protected.

Mohan, a senior director at C-DAC Mumbai told me about a number of projects he has worked on to make software more accessible. One project, which was jointly carried out with the NRC-FOSS, customised a text reader called Orca so that blind and visually impaired Indians can now download a fully accessible Linux based operating system. He then worked on a project to create software to use for those with physical disabilities that incorporated features like predictive text to auto complete the current word – this was started in English and then extended to Hindi. They also created a distribution for people with developmental disabilities which was a very simplified and easily manipulated operating system – they worked with developmentally delayed people to design it and then tested it but by then the government funding for the project ran out and so all their accessibility projects ended. However, all these software packages were contributed back to the open source community and can be picked up and continued if and when someone has the funding and initiative.

In addition to issues of access with regard to ability and language there are significant physical barriers to access for the majority of Indians who live in rural areas. The expense and logistics of creating and maintaining the technical infrastructure are significant and Internet Service Providers (ISPs) may not see enough return on investment to make connecting all of India to fibre-optic networks worthwhile. A technical solution championed by many in the Indian FOSS community is to circumvent both industry and government and create self-sustaining mesh networks.

Mesh networks are an alternative configuration for providing internet access. Whereas the standard structure for delivering internet connections has an ISP which routes in a hierarchical and closed circuit a mesh network is comprised of a group of interlinked and equal ‘nodes’ which share information and data. The more nodes added to the network the stronger it becomes. Additionally, should one part of the node stop working, the system will automatically reroute
around it ensuring continuous service. In a hierarchical ISP structure if any part of the structure is compromised the entire system can go down and many will lose access. Mesh networks are relatively cheap and easy to set up using computers, mobile phones and routers that, once connected, are self-sustaining. This is ideal for remote locations where WIFI and cellular towers are rare and/or unreliable. Further, mesh networks have important political implications as they cannot be shut down by government or industry. For all of these reasons many in the Indian FOSS community see mesh networks as an economically, technically, and politically ideal way to bring internet access to underserved populations. Neel, a Mumbai based entrepreneur explained how mesh networks were used in Libya during the Arab Spring, adding that mesh networks are “trying to connect with people rather than just connect to making a livelihood.” However, despite the many ways in which mesh networks offer an effective means to bridge the digital divide in India to date there are relatively few mesh networks set up.

While discussing why so many seemingly ideal FOSS technologies were not being used, Jai, an NGO director in Trivandrum agreed that India has not yet used open source to its potential. He then added that he understands the policy makers’ dilemma. The average minister does not understand the issues fully so they will look at it from the perspective of who is the loudest and most influential, which is usually proprietary vendors, and when free software activists speak they are “not very sophisticated... the image issue is there.”

Regardless of the obvious economic and technical advantages of FOSS when it comes to development projects and goals it is not my intension to suggest that FOSS for development necessarily bypasses all of the problematics of ICTD generally. It does not. Technology in and of itself, even FOSS, cannot address or resolve sociocultural inequities. However, the inherent qualities of FOSS in terms of its inherent transparency, customisability, and low or no cost do offer the most potential for meeting the development goals that can be met through technological interventions.

**FOSS Policies and Practice**

This section focuses on FOSS policies and practice in the government, education, and industry sectors. Despite clear economic and technical arguments in favour of FOSS, a majority of Indian government departments rely on vendors who sell and maintain costly proprietary software solutions, even though it is now a mandatory policy to use FOSS whenever possible. To better
understand the contours of the gaps between FOSS policy and practice in the government I will
review a recent study on the economic impacts of FOSS for the Indian government and then
discuss my informants’ experiences in government generally before exploring how FOSS is used
in government run education specifically. I will then explore the ways in which FOSS is used
within the Indian business community.

**Government**

India’s government is a combination of a unitary and limited federal system with a central
government headquartered in New Delhi comprised of executive, legislative and judiciary
branches as well as ministries and departments. Each of the 29 states also has its own
government consisting of executive, legislature and judiciary branches as well as departments.  
Indian states do have autonomy over many aspects of governance but as state governors are
appointed by the national president and state courts are ultimately subject to rulings by the
Supreme Court, there are limits to state autonomy. Within states there are districts with their own
departments and cities, too, are positioned within the complex webs of district, state and, in some
ways, national government. Although all government departments use software and have relative
autonomy when it comes to choosing software, according to my informants, relatively few
departments or offices in local, state, or central government use FOSS. Below I will outline
several government policies and then discuss how these policies are put into practice.

The branch of the central government with the most influence when it comes to software policy
is the Ministry of Electronics and Information Technology (MeitY), which before 2016 was
housed within the Ministry of Communications and Information Technology and called the
Department of Electronics and Information Technology (DeittY).  
Prior to 2012, the DeitY was
referred to as the Department of Information Technology. However, there was a push to prioritize
India’s electronics industry and so in 2012 the DeitY was created. Today, the MeitY has a budget
of ₹6,000 crore (£678,300,000.00) and remit over several departments and organisations,
including pro-FOSS entities such as C-DAC and the National Informatics Centre. The rapid
changes to name, structure, and power of this government organisation speaks to the ever
growing importance of electronics and information technologies for organizing and implementing government services. The increasing scope of government IT projects needed to improve and integrate government function and service also represents significant business opportunities for IT companies to provide and maintain the bespoke software needed to implement these ambition plans. Although exact IT procurement budgets across government departments are difficult to obtain, Lupo-Pasini and Singh (2012: 273-4) were able to estimate that in 2011 IT acquisition comprised approximately 50% of government procurement budgets. Considering the growth of e-governance initiatives since then it can fairly be assumed that these budgets have remained constant if not grown. In sum, the Indian government’s IT needs represent a very lucrative business opportunity for software vendors.

The central government officially adopted a pro-FOSS policy in 2015. The policy was created by the DietY and the Ministry of Communications and Information Technology and made FOSS the “preferred option” for all organisations which report to the central government. In practice this means that when government departments plan to implement a program which requires new or expanded software capabilities and invite tenders, the Request for Proposals (RFP) states a preference for FOSS based products. Significantly, the policy uses the term Open Source Software (OSS), defined as:

The source code shall be available for the community / adopter / end-user to study and modify the software and to redistribute copies of either the original or modified software. Source code shall be free from any royalty (F. No.1(3)/2014 –EG II: 3).

While this definition encompasses the four freedoms inherent to FOSS, the fact that the government has chosen to omit the word “free” is important. The term FOSS was used in previous government funded efforts to promote FOSS, such as the centrally funded NRC-FOSS. The move from FOSS to OSS at the central level may be intended to signal to the software industry (both in India and abroad) that the government is not affiliated with any of the political forces associated with the free software movement in India, indeed this was suggested to me by a free software activist. I was unable to secure a definitive explanation from anyone involved in the policy, however.

The goals of the pro FOSS policy are in line with previous policies on open standards which encourage transparency and collaboration within and between departments for carrying out

government services and projects. There have been pro FOSS advocates within all levels of the Indian government since the 1990s but as noted in Chapter Two, despite this, those in charge of the Department of IT at the turn of the century opted for a silent “no policy” which was in practice pro FOSS but would not upset or scare off those in the proprietary IT industry. The vision for FOSS in India that was held by many in what is now the MeitY, as shown in Figure 6.1, clearly demonstrates high hopes.

**Vision**

![FOSS Vision](http://meity.gov.in/content/free-and-open-source-software-accessed-7-5-2018)

Figure 6.1 FOSS Vision. Source [http://meity.gov.in/content/free-and-open-source-software](http://meity.gov.in/content/free-and-open-source-software) accessed 7/5/2018

In addition to the pro-FOSS policy the central government also has several initiatives that have potential to be FOSS friendly, for example the Make in India[^68] and Digital India[^69] initiatives. Such initiatives are focussed on improving and promoting Indian technology and industry and as such could benefit from incorporation of home-grown FOSS solutions and, to be fair, several components of these and similar government initiatives do use FOSS but not nearly to the extent possible or, according to the official open source software policy, to the extent preferable.

In a 2015 report on the economic impact potential of FOSS usage in government, De’ argues for increased FOSS adoption throughout government departments. By focusing on a Total Cost Ownership (TCO) approach to software choice, which includes not only the cost of the software...

licence but also the cost of labour needed for maintenance, support and training, it is easy to see how governments in developing nations with low labour costs could reap significant savings if they switched to software with low or no cost licences (2015: 4). He addressed the technical, economic and moral implications of FOSS adoption by organising them into tangible and intangible costs and benefits. Using case studies with education and police departments across seven Indian states he compares those who use proprietary software with those who use FOSS as well as those who use a mixture of both. Tangible benefits for organisations that use FOSS include import substitution savings, improvement of e-governance capacity and sharing capability across departments by supporting local companies that provide FOSS services vendor lock-in is avoided and, finally, data security is enhanced because the data belong to the organisation and are not accessible to software corporations (2015: 9-10). Intangible benefits for governments to adopt FOSS include increased IT competencies because the software is created and maintained by the local community, and access to government source code can foster democracy. Further, FOSS has been found effective in bridging the digital divide (2015: 15). However, De’ found significant hurdles to adoption in the education and police departments he studied. One major hurdle is dependence on vendors who, once hired, decide what software to use. De’ found that decision makers at the state level choose vendors because they are unaware of the benefits of FOSS and/or they perceive the time and effort needed to implement FOSS-based solutions as untenable (2015: 10). He also found that many of his respondents who had heard of FOSS were misinformed about it. For example, several people interviewed stated that FOSS led to vendor lock-in, was more expensive and more prone to viruses than Windows (2015: 10). Significantly, a key finding, which cut across departments who used FOSS and/or proprietary software, was “helplessness with regard to choice of technology” due to hierarchical decision making practices (2015: 10).

De’s findings speak to general problems encountered when enacting policy within an organisation. For policy to become practice, decision makers within the organisation need the necessary knowledge and autonomy to change practice. Upon review of the MeitY open source software policy, it is clear that this policy, while mandatory, is also easy to sidestep if any government decision-maker wanted to use proprietary software:

However in certain specialised domains where OSS solutions meeting essential functional requirements may not be available or in case of urgent / strategic need to
deploy CSS based solutions or lack of expertise (skill set) in identified technologies, the concerned Government Organisation may consider exceptions, with sufficient justification (F. No.1(3)/2014 –EG II: 4).

The above exemption means that if a government department is unable to find an open source product which meets its specific needs or that its needs are so urgent that searching for an open source product would hinder work, or if the department does not have people who understand open source products, that it may be exempted from using open source software solutions.

Several people told me this exception can be interpreted in such a way as to provide ample room to claim attempted compliance.

Of course there are many pro-FOSS cells within central and state government departments and certain parts of several project’s infrastructure are carried out with FOSS. At the state level, for example, Nitesh, who heads an NGO in Bangalore, told me that in Karnataka at least, free software is being leveraged in the “India Stack,” the world’s largest application programming interface, but that governance projects are not becoming free software projects. He suggested that the electronic procurement system in the state should become an independent free software procurement system so that all the states of India could access the source code for Karnataka’s government procurement system and tell their vendors that they need support or modifications on the same software. He explained that currently if secretaries from two states like each other they may share/transfer code. He said ideally states would share and continually refine software but this is not being done because there are not enough senior software engineers within government who understand that this is how it should be done.

Many people I spoke with who have worked in and with various government departments cited numerous examples of how a combination of technical ignorance, lack of authority to implement changes, and corrupt relationships between ‘higher ups’ in the government and proprietary software vendors worked together to thwart efforts to implement FOSS more widely. For example, PV, who has worked several government departments, as well as C-DAC, told me when explaining why the central government does not take better advantage of FOSS:

It’s just that maybe because of the relationship between the corporations [and] governments are very strong... you never know ...what are the pure reasons. Or maybe the governments do not have well educated people who can really understand the power of FOSS. Maybe they... [have] never been exposed to [a] pure FOSS environment.
Ramakrishna recounted how bureaucracy itself can impede FOSS adoption. He told me about his discussions with Tamil Nadu’s transport department. The department was considering switching from their SQL database (a proprietary software) to a FOSS database. It took two months for Ramakrishnan to set up a meeting with heads of various departments. However, the planned meeting had to be cancelled, and is yet to take place. Even if the discussion to change to a FOSS based software is made, the bureaucratic procedures to implement the decision could be derailed in-process and, if a new party comes to power in the next election these decisions can all be reversed.

Changes in political party at the state level were cited as significant when it comes to FOSS adoption. When the Communists were voted out in West Bengal in 2014, Microsoft offered the new government incentives to switch over and they did. While discussing where government decision makers get their information about software options Anand told me that propitiatory software vendors will intentionally misinform them about FOSS. I asked if the vendors really had that much influence and he replied: “Of course, massive! The vendors go to the extent of misinforming you heavily... Goa had some progressive minded people... they went with open source... these vendors went in and just brainwashed everybody saying no, no, no big mistake, don’t touch it... back to proprietary.” Anand explained that there is also corruption wherein proprietary software vendors give kickbacks to decision makers in the government.

While discussing state-level FOSS policies Anand emphasised that how open source policy is enacted will vary from state to state and depends on many variables – it is person dependent, population dependent, and civil society dependant. He stressed that the political party in power is also important though he clarified that you cannot say any party is for, against, or neutral when it comes to free software. For example, there are some states where the BJP are very pro FOSS and some where they are not. After noting that the pro FOSS sentiment on the right is based on an idea of indigenous software he laughed and said that BOSS Linux, the operating system that came out of the NRC-FOSS [through C-DAC] discussed in Chapter Two is basically Ubuntu with a few changes, adding:

I sometimes take a very strongly nationalist stand on this ‘India!’ [pounds fist on desk] but... being an academic, I also have trouble with these nationalistic stands. These are very problematic, Trumpian build a wall kind of. But finally if you’re playing realpolitik and doing activism you have to take whatever stand works for the moment.
Undeniably, pragmatically taking whatever stand works for the moment is a strategy many in the FOSS community unabashedly employ.

In addition to all the obstacles listed above are challenges of training and maintaining adequate support staff to ensure all the systems work as needed. Many people pointed out that, from a manager’s perspective, if a system broke down they needed someone to yell at. Part of a vendor’s role is to provide someone to blame if and when IT systems breakdown. Another hurdle is convincing staff to switch from an operating system they are familiar with to one that is slightly different. Despite the difficulties aligning all of the variables necessary to fully implement FOSS on a large scale, I was privy to an example of a government enclave for FOSS at a hospital in Chennai.

Sam is the head of IT for a large hospital for railway employees. He explained that because the Indian railways is operated by the government and employs so many people it has its own national healthcare system, which includes hospitals like his. The Indian railway employs 1.5 million people and has 550 healthcare outlets, though most are small. This hospital, which serves Tamil Nadu and Kerala, was built in 1931/2 and has 505 beds. The hospital treats ninety thousand patients per year and two thousand outpatients daily. Family members of railway employees are also covered by the health scheme, including spouses, children (boys until age 25, girls until they are married) and dependent parents or other dependent relatives. As we walked through the buildings we passed hundreds of people, many elderly. The hospital is obviously capable of treating many, if not most maladies, but is run down compared with the only other hospital I visited in Chennai, which was a private one recommended for foreigners. The lighting was dim, the walls showed cracks and could use a fresh coat of paint, there were people sitting in the hallways and stray dogs curled up in a corner here and there along inter-building walkways.

Sam explained that because he and his team developed all their own systems using Linux they have more control and thus confidence in their systems and never have to spend time waiting for a vendor to figure out what is wrong. In addition to control and confidence he likes that he can ask for help or advice from people all over the world. This commitment to technical control extends to hardware too – he said they just use simple PCs for their servers because he does not want to get locked into manufacturer contracts which require vendor maintenance. He added that if he is not happy with one open source software he can easily switch to Python for example.
whereas with proprietary he would have to deal with expense and other “formalities.” Another plus for open source is that it does not get discontinued – he has been running some applications since 2002 because they still do what he needs them to and he does not have to worry about losing maintenance support. When asked how it is that he has so much autonomy to make these choices he replied: “Ah, that’s one of the best features of this hospital. ...it’s rare but our hospital is highly professional, all the people are doctors so we don't stick to normal bureaucratic way of doing [things].” Because his department is on the periphery of the bureaucracy and he uses FOSS and thus does not get anyone's notice with his budget expenditures, he is free to do what he likes with the technical aspects of the job. His low budgets mean that his boss never has to ask his boss for money for this department and thus IT only needs to involve one or two levels of bureaucracy.

Sam gave an example of how he has been able to use open source to improve hospital services beyond IT. The hospital got digital X-ray technology in 2009, but each viewing station cost about Rs.50,000 and in this hospital they needed about 100. For four years only the radiology department had viewers. Then Sam got an open source technology that allowed the X-ray images to be shown even on cell phones and now as many staff as need to can view X-rays. This saves the hospital one million rupees per year compared to what they would have to pay to the proprietary company. This also ensures more patients are cared for.

Despite all of his successes using a FOSS based system to run a large and complicated hospital, Sam has been unable to convince any other IT departments in railway hospitals to follow suit. He thinks the issue has to with really understanding the software. He explained that only when you yourself develop the software will you have the needed confidence to rely on your own abilities; when the development is outsourced or given by someone in Delhi “You don’t have the confidence of shifting or migrating to any other platform.” Sam is making a key argument about how FOSS not only build capacity but also confidence which leads to technical autonomy amongst its users.

**Education**

Although a majority of Indian schools (primary and secondary) and many colleges and universities are government-run and therefore educational software policy could be analysed alongside the other government departments, the education sector has some specific
characteristics and implications that deserve separate analysis. FOSS activists try to change and improve Indian education in several ways: by trying to include FOSS in computer science curricula, conducting training seminars, lobbying government, and starting on-campus clubs. Although most of their efforts are focused on university students there are significant forays into primary education as well as we saw in the Kerala case discussed in Chapter Two. Activists posit that the introduction of free software to Indian students will improve their education because, by definition, learning to create FOSS entails a level of technical and educational engagement which is not possible when learning propitiatory software, especially within the rote learning methods in most Indian schools. FOSS also benefits Indian education because it is inherently malleable and can be adapted to administrative and language requirements. Further, they contend that because it is free of cost it can save schools money that can be utilised elsewhere.

With the exception of Kerala, access to high-quality primary education is far from universal. Improving educational access and outcomes is necessary for evening out the nation’s development. However, the people who are in charge of shaping primary education are not well informed on the merits of using FOSS. Anand explained syllabi will stipulate that students have to learn to use Microsoft Excel, for example, instead of a spreadsheet application which does all of the same things as Excel. The proprietary companies have lobbyists who sit with the ministers who are responsible for creating the syllabi and education policy. He explained that the people in government who write the policy are usually generalists, and so if someone will come and offer professional industry guidance, for example that students should know Excel to get a good job, the policy makers take this advice. Of course the motivation for propitiatory software companies in defining the types of software children are taught is to ensure the next generation of end-users.

In addition to fighting for the inclusion of FOSS options on syllabi, FOSS activists want to reshape pedagogical philosophy as well to better reflect the values of openness and collaboration inherent to FOSS. For most children attending government schools the pedagogical philosophy is based on hierarchical rote learning wherein the teacher delivers lessons and the students are told to memorize and repeat back information. Deepak, a professor in Mumbai, is working on several projects aimed at disrupting this scenario in an effort to produce more engaged and creative pupils. He explained, “Our education is also mostly consumption oriented, it’s not production oriented.” He is working on a project called G Studio that is a “git for culture.” In other words,
playing on the idea of the most popular FOSS repository, Github, it is a repository for cultural artefacts. Constant updates on progress of students are encouraged, and this is a mirror of what happens on software mailing lists and Github to keep everyone current in a digital space. Deepak feels this kind of learning environment is important for a large country like India:

An academy should be working, not in classrooms but in studio spaces. It could be distant space… if you are face to face you should be face to face in a round-table not one to many kind of design setting. So this is a kind of cultural intervention which... is very important to me as an educationist because this is something that possibly can sustain the creation of more and more thinking and maker people, because we need more makers than consumers. And then the option of seeing how this could go into villages.

The IT@School project in Kerala discussed in Chapter Two provides an excellent example of how the integration of FOSS in primary education can change the education dynamic for students and teachers. Several studies (Gurumurthy 2010; Krishnaswamy and Marinova 2012) have highlighted the ways in which implementing FOSS based learning throughout the state have improved education outcomes for students as well as skills and confidence among teachers, who are responsible for understanding and fixing the software and hardware. Students are taught not only how to use software applications, but also how to write and fix code. Students and teachers work on projects in collaboration, disrupting the rote learning model prevalent elsewhere.

The majority of FOSS activism in the education realm happens at colleges and universities. While still an enclave for the relatively elite, post-secondary education is seen as an important investment for poorer families with aspirations for their children to move up in the class system through the kinds of employment only available to degree holders (Jeffrey, Jeffery, and Jeffery 2005). Although government jobs are still sought after, most families calculate that an engineering degree represents the best chance to do well. The success of the IT industry has inspired many to pursue software specialization but many FOSS activists lament that most post-secondary software programs which use proprietary software and rote learning methods do not teach students the skills needed to do more than follow directions. Nitesh told me most people graduate without having ever written any code. Several people told me that the Indian software industry is trying to move away from services into products but this won’t be possible unless the education system is changed and students come out knowing how to read and write code, and
prepared to do innovative work. The effort to shift the Indian IT industry from mainly service work towards producing innovative products includes calls for curriculum and evaluation reform.

The educational interventions of the FOSS activists are well thought out and sensible but there are several hurdles to implementation. The first hurdle is that the education policy makers in government are enmeshed with the proprietary vendors, either through ignorance of alternatives, corruption, or both. A discussion with Rishad, a lawyer from the Software Freedom Law Centre, exemplifies this. He told me about a recent example of the central government wanting to create free online courses at the college level. Initially it was decided that a free software called Open Index, which is used by Harvard, would be used. Then, suddenly, it was announced that the job was given to Microsoft with no explanation. Many FOSS advocates are suspicious of the relationships between proprietary vendors and government. With that in mind, the SFLC has filed right to information requests to find out how this happened but as of yet they do not know. Frustrated, Rishad added:

If Harvard can run it, if the IITs can run it, why can't the Indian government? And the sad part is the Indian government has a policy to use open source software... so when you have such a policy, especially with a thing like education... you have a vendor lock-in problem, once you [are] in there you cannot get out.

The second major hurdle to FOSS adoption in post-secondary education is that engineering departments and lecturers themselves are often ignorant of Linux specifically and FOSS issues generally. For example, Arivindha told me that when she decided to do her final project of her Master’s in Computer Science using Linux to create a Tamil font her engineering college was not happy about it because they were entirely unfamiliar with Linux. She had to convince the school to let her do the project in Linux by explaining what it was and how it was a valid operating system. Arivindha, who had been converted by Ramakrishna, who visited her college, then set up a LUG there herself. One professor told me that although still common, ignorance of FOSS in engineering schools is changing as FOSS becomes more important in the market, especially with Android and some big languages like Java and Python. He thinks the post-secondary education will follow suit.

**Industry**

Unlike government, industry is not beholden to policies and, in theory, is free to utilise FOSS in any manner desired. FOSS represents a number of opportunities and issues for the Indian IT industry. On the one hand, embracing FOSS based technologies is necessary to stay relevant.
FOSS based systems, especially databases, Android, and programming languages are increasingly popular. Accordingly, ISPIRIT and NAASCOM, the two most influential organisations for the Indian IT industry both promote several FOSS projects in the private sector as well as in public-private partnerships. On the other hand, there are some significant obstacles to widespread FOSS adoption in the Indian IT industry. The issues which forestall Indian IT companies from embracing FOSS include challenges with working in FOSS based business models, complex licence compliance issues, intra-industry dependencies with proprietary companies and, finally, negative perceptions of FOSS. In this section I will discuss the how these obstacles and opportunities shape FOSS uptake in the private sector.

There is a FOSS based IT company presence in India, though it is small, comprised of start-ups and the Indian offices of American based FOSS companies. These companies work with and create FOSS based products and services which means that anyone who wanted to could acquire the products for free. Since FOSS based companies offer their software for low or no cost their business model is based on support and consultation services.

Hari, who owns a Mumbai area start-up, took me through the process of starting up and eventually succeeding with a FOSS based business. He grew up tinkering with computers but always knew that he would end up working for his family’s business. To that end he studied industrial engineering, receiving a Master’s degree from an American university before returning to Mumbai in 2004. While working in the family business he realised their accounting, inventory and sales software was not very good so he decided to create an application. He developed such a good system for managing the inventory and accounts that the family sold their business to invest in his start up. Although he is grateful for the family support, he said the support is a double edged sword because, as an open source company, their main goal is not profit and his family investors may not always appreciate that. Although anyone can download the software for free, the company offers data storage and email/domain services as well as technical assistance for a monthly subscription fee. They will also customise the software for a fee.

Hari used Python to create the application so it was open source but at the time he did not really understand the philosophy and community side of open source. So, although the project was open source and used a GPL licence he did not market it as such. He pushed the application out on Google in 2008 but it did not get much attention. Then, in 2012, an intern posted it on GitHub,
and things really took off because GitHub was “the place to be.” Over the next few years it became more popular and now they are the second largest software company of its kind globally.

For Hari, the biggest challenges of running a FOSS based start-up in India is finding qualified staff. When asked how he recruits talent he explained that most people in India want to work for well-known companies like Google and Infosys: “All the cream is taken away by the big companies...” He said that because of this, until recently, start-ups were not a known concept in India and very few people want to work for one. What he gets are people who “fall through the cracks,” meaning people who for whatever reason need to work in Mumbai or are specifically interested in working for an open source company.

Hari also finds the Indian FOSS community unreceptive to start-up culture. That said, he volunteers with iSPIRIT, an Indian software alliance, to help conferences that will showcase open source projects because he thinks that the big conferences like Open Source Asia in Bangalore only showcase big corporations, not projects. He told me that whenever he has tried to reach out to people in the Indian FOSS community he has been disappointed. He feels that the government should choose open source for all publicly funded work but that there is no accountability for any government funded open source projects such as NRC-FOSS or C-DAC. He said that when he attempted to partner with some government funded FOSS projects a few years ago “They just end up being self-serving projects... there was really no energy in these people who ran these organisations, they weren’t visionary... they weren’t connecting with people in the local community.” He is frustrated that so many projects get funded but do not seem to have much impact. He feels that he is not a part of the open source community in India – he feels more of a sense of community online when he participates in specific projects. He said that aside from Dev’s start-up in Bangalore he cannot think of another open source only Indian company.

Dev’s company is small but stable. He gets a lot of business from companies and government departments that want to migrate to FOSS. He also has a few clients who found out about and hired him but did not know about FOSS. He told me that, unfortunately, he does not have much competition and this is hard for him because it is hard for clients to compare him to any similar companies – they will compare him with Microsoft or another huge corporation and he does not feel that is a fair comparison. Another problem for his company is that Microsoft and Google
donate “free” technology and services to colleges who then do not want to pay for his services creating and supporting actual free software.

It is true that there are very few FOSS start-ups in India. During a discussion with Sujan and Neel, two Mumbai area FOSS enthusiasts who have been active in the Indian FOSS community since the late 1990s, I learned a little more about why that is. Sujan explained that the venture capitalists (VCs) who are integral to the start-up business model are hesitant to fund FOSS because they do not understand that a company can make money if they do not own the code. Neel added that he has learned from experience with his own start-up that VCs only care about quick growth and profit. He explained that you can have a successful FOSS business model but the problem for VCs is that the FOSS model is concerned with being accountable to users whereas traditional business is not. According to Neel VCs and other business people do not want the inherent transparency of open source, once they understand that anyone can make sure the technology is not hiding or collecting anything without the user’s knowledge. Neel echoed Hari in that he feels start-up culture is not yet widely understood or approved of as a sensible employment option in India. Add to that the difficulties of acquiring start-up funding from VCs, and it is not as surprising that very few of the people who are passionate about FOSS are creating their own businesses.

Major American FOSS industry players like Red Hat and Mozilla have a presence in India, though it is limited. However, this does not mean that FOSS is not vitally important to the Indian IT industry. Ramakrishna explained that a large part of the IT work done in India is software testing for multinational corporations and FOSS is used heavily for this. Indeed FOSS has become so ubiquitous in software testing that most people who use it are not even aware of its status as such and even “hardcore proprietary” software companies use it. Ramakrishna stressed that with industry acceptance of FOSS as quality technology, students who have FOSS knowledge are desired but he added “FOSS is not something which you can just [have] on the shelf and read for four days and then examine... you have to be involved in it and learn things from it, which is true any decent subject knowledge.” Countering this, Karthik told me that if and when knowledge of a FOSS based technology is needed for outsourced work, then the management of the Indian workers will arrange for a class so that they can be brought up to
speed. This sort of arrangement is also a useful strategy to occupy engineers who are “sitting on the bench” in-between assignments because they can become more employable whilst waiting.

In addition to using FOSS for carrying out routine tasks, Indian IT companies also invest in FOSS projects. Nitesh told me that Infosys, one of the largest IT companies in India, has had an internal LUG since 2000, attesting to widespread interest and support for FOSS within the company. Anand told me that he discovered that all of the major Indian IT companies are involved with FOSS but it is not in their interest to publicize this. Anand told me that after some of his research on FOSS in India was published, Tata Consultancy Services, one of the oldest and most successful Indian technology corporations, asked him to give a talk on FOSS and some very senior executives attended. He learned that they employed several thousand engineers who specialise in free software. He suggested they take out a full page ad in an industry paper saying they will support anyone doing open source because they have the resources to do so but they kept quiet because they are “sleeping with the vendors” and they sign Memorandum of Understanding (MOUs) with all the proprietary players. After his experience with Tata he went to Wipro and Infosys among others asking them to publicly support open source. He estimates that in Bangalore alone there must be 50-60 thousand engineers working exclusively on open source for these companies so it is big business, but these companies still do not want to officially, publicly come out as pro FOSS businesses. He thinks this has to do not only with the agreements they make with clients but also with potential legal ramifications of licence compliance issues.

Anand emphasised the importance of licence compliance by sharing a story of an Indian software company that had sold some software to an American company. The Indian company had used some FOSS code mixed in with the proprietary code and in so doing had not complied with the FOSS licence because now some FOSS code was inaccessible when bundled into the proprietary code. The American company was very wary because a lawsuit from the creator of the FOSS code could result in millions of dollars in fines. There are programs in existence that will check the licences of the code you are using to ensure you are not accidentally violating any licence stipulations, which can vary quite a bit depending on how ‘free’ the code is. The Indian company who had unwittingly violated the FOSS licence by bundling it in with proprietary code ended up buying the compliance checking software company. In this case the issue was resolved but many
IT companies are wary of incorporating FOSS into their projects for fear of accidentally violating what can be complicated licences.

The final major hurdle for FOSS adoption in the Indian IT industry can be understood as a side effect of conservative corporate culture in which the people in charge of software procurement are trying to minimize their likelihood of being responsible for any negative outcomes of the product. Ramakrishna said this kind of decision making disfavours FOSS for three reasons, one is a logistics issue and two are perception problems. He explained that the logistics problem is a lack of organised technical support. There are two prongs to the perception problem: 1) that anything free or cheap is poor quality and 2) the FOSS community is associated with leftists and radical politics. The issue of technical support is crucial. If and when software does not work as needed you need a number you can call to get help as quickly as possible to minimize interruption to business. The FOSS community has many help forums and listservs with active members but it has no legal responsibility to help you so you have to find and negotiate help. One advantage of Microsoft is that you can call them and they have to respond. The perception that FOSS is poor quality because it is free is fading but several people told me that one key aspect of software procurement was the status associated with a name brand. Neel told me about how he had recently agreed to work on a million dollar proprietary project. However once he started working with it he was disappointed with the poor quality of this well-known software when compared to a FOSS alternative. When he voiced his disappointment he was told by a senior company official that the reason people go with this expensive product is that the company CFOs can go with “the brand” and no one will get mad if the software is not great because the decision is based on brand reputation and the high price implies a good product, even if it is not technically sound. Neel said that, for example, you cannot get fired for going with Microsoft. So decision makers in companies must choose software not only on its technical merits but also on what the consequences will be for their careers if the software they chose has a problem. With FOSS products this could easily lead to trouble if technical issues crop up and there is not a software company representative to push the blame onto. The association of FOSS with left-leaning politics, specifically with the Communist party of India, also feeds into the reluctance of decision makers from associating their company with potentially radical or unpopular politics.
FOSS and NGOs
India is home to millions of Non-Governmental Organisations (NGOs). Some estimates place the number over 3.5 million or one NGO for every 400 people, making India one the most NGO saturated nations worldwide. After government and industry NGOs represent a significant third sector engaged in meeting regional and national development goals. Since the BJP was elected in 2014 the central government has been cracking down on the NGO sector claiming that the often foreign funded groups have agendas that run counter to national interests and goals. For example, several prominent organisations working in India including Greenpeace, Amnesty International, and the Ford Foundation have been informed they can no longer accept external donations or funding.

Despite recent government crackdowns, NGOs are still an integral part of the Indian development ecosystem. Because NGOs exist to do work fulfilling a particular mission or vision and are usually non-profit, it would seem that NGOs would be prime candidates for FOSS uptake so that their budgets could be better utilised towards furthering their mission. However, with the exception of a few NGOs centred around FOSS, very few NGOs in India take advantage of FOSS. In this section I will details the challenges to FOSS uptake amongst NGOs in India as well as some efforts to make FOSS more attractive and viable for NGOs.

Why do NGOs use expensive software?: Microsoft and Taxes
I asked Nitesh, the director of a FOSS-centric NGO, if he knew how many NGOs use FOSS. His answer echoed others when he told me that while many people in NGOs will use FOSS technologies there are very few organisations that rely on FOSS exclusively. He explained that NGOs do not spend on software so the cost savings are not an issue; NGOs usually get software for free as a donation from Microsoft or another funder or, if it is not donated, they just pirate it. Further, Microsoft is getting very creative in how they charge for licences, that they will sell a cheap laptop with their software preloaded. Any software expenses then get buried in the maintenance costs of NGO budgets. According to Nitesh, the other major hindrance for NGOs to adopt FOSS is that the accounting application used by the majority of Indian accountants, Tally, is proprietary. Because chartered accountants use Tally and NGOs need to work with chartered accountants they are forced to use proprietary software.

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accountants for regular required audits they cannot shift their accounting software if the chartered accountants do not want to shift to different, less well-known free software. Before discussing the influence of Microsoft in the NGO sphere, I will discuss how one free software activist is attempting to change how accounting software is made and used in India.

I only had one week in Mumbai but during that week I spent a lot of time with KK, a young man who runs an accounting software start-up out of an apartment. It took me a while to find his building and when I finally got the 11th floor and knocked on the door I was momentarily disoriented when, after he opened the door he did not return my smile or accept my proffered hand in greeting. I followed him inside and it took me a minute to ascertain from the way he moved and where his gaze fell that he is blind. I was offered a welcome glass of fruit juice and I took a seat in the lounge where there were several computers set up and four or five young men and women working. During our conversation he told me about how, as a teenager, he learned about software and socialism around the same time and knew that he had to pursue both. When he went to university, because of his blindness, he was not permitted to study computer science because the appropriate text to speech software was not available. He studied psychology instead and then he applied to do a Master’s degree in computer science, demonstrating to the university that with the appropriate software adaptations it was possible. He worked with free software and became involved with the Free Software Foundation of India, even meeting with Richard Stallman on one of his visits to India. Following his postgraduate degree he worked on a text to speech application and then, when he realised that there was not a good FOSS version of accounting software in India, he decided to create one. The application is funded by a nexus of organisations including, government, corporate, and NGO sponsors who want to use the software. His team has just finished the third version of the application and it is now stable enough to deploy.

Although accounting software may not sound exciting, KK’s project represents an important, if pragmatic, intervention. Offering a FOSS alternative for a fundamental software application used by all Indian organisations, be they private, public, or non-profit can more easily shift India away from proprietary software. For KK, whose interest in technology is tied to his desire to use it towards development goals, digital independence is essential. Now that the application is up and running his team is also working to train up youth in rural areas in book-keeping with the
software as a means to upward mobility. However, despite efforts such as this, digital independence from proprietary software, especially Microsoft, is a long way off.

In an up-scale coffee shop in central Mumbai I had a long and lively conversation with Neel and Sujan, two men who have been working with FOSS for twenty years. When the topic of what the Indian government could or should do about FOSS came up, Neel said “a lot more can be done” adding that was a “kind” way of saying it. Neel went on to say that once the government had announced a preference for FOSS a few weeks later Bill Gates came to visit and gave hundreds of millions to fight AIDS through the Bill and Melinda Gates Foundation. A few weeks later the government rolled back and said they were not ready for FOSS yet. Months earlier when I asked Sanjay in Bangalore if he sees FOSS as a political issue he said not in India, explaining that Bill Gates gave India a billion dollars for development. Sanjay feels the PM or president cannot then say we will not use Windows, clarifying that he does not think Bill Gates is saying the money is tied to using Window but added “...it will be unfair if our government also to receive money from Gates Foundation and say we will not use Windows.”

The relationships between philanthropic organisations and the technology industry are strong. Several recent studies on the ways in which IT billionaires funnel their fortunes through philanthropic organisations demonstrate how these acts of charity are carried out in opaque institutions which are not accountable to governments and that the creation of these foundations also provides a means through which wealth can be washed clean and remain untaxed.72 In fact some philanthropists go so far as to say the philanthropic work they do is their self-imposed tax while they use their tax exempt philanthropic organisations to funnel their fortunes.73 This convenient tax loophole is utilised whilst philanthropists offer up their own visions for a better world to fill in the gaps where governments that would benefit from their withheld taxes can no longer provide adequate services. Of course the most recent trend of billionaire philanthropists is just the latest incarnation of Industrial Barons such as Rockefeller and Carnegie. FOSS provides a useful lens through which to view how the philanthropic goals of tech billionaires generally and Bill Gates specifically impact the development goals of the nations they are aiming to help.

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73. https://www.dissentmagazine.org/article/plutocrats-at-work-how-big-philanthropy-undermines-democracy accessed 7/7/2018
Microsoft and the Bill and Melinda Gates Foundation (BMGF) both do a lot of work in India. In 1990 Microsoft opened its first Indian office in Hyderabad. With a lofty, if vague, mission to eradicate poverty and disease, the BMGF has a larger budget than many sovereign nations. Microsoft looks to India as an economical supplier of labour as well as a lucrative business opportunity in terms of both existing markets in government, education, and industry as well as an emerging market represented by millions of Indians who are joining the middle class as potential consumers of Microsoft’s products. The BMGF is very actively working towards propelling millions of people in India (and globally) into the middle class and of course uses Microsoft products to run its projects, significantly in education where first time computer users are introduced to their software.

Despite the government’s recent efforts to limit the influence of foreign interests, historically the Indian government has depended on both Microsoft and the Gates Foundation for business and aid, respectively. So, just as Microsoft and the Gates Foundation need India, India needs them. That Microsoft has been proactive in addressing rumours that the government may adopt a pro-FOSS policy in the early 00s is demonstrated by PV’s experience, discussed in Chapter Two, of being assailed by Microsoft executives when he convened a round-table to discuss how India can best utilise FOSS. Also discussed in Chapter Two are the Microsoft OXML standards debates in 2008 in which Microsoft tried to define the technical characteristics of documents used in government and industry. Parallel to these interventions into how the Indian government uses and defines software, Microsoft has opened up more offices and employed more Indians, giving it more power to negotiate its presence in India as other, even cheaper, outsourcing locations emerge. All the while Microsoft’s presence in India has grown, so too has the BMGF. The BMGF is not registered as an NGO in India but operates a liaison office in New Delhi, meaning that it is not subject to the government’s Foreign Contribution Regulation Act which gives the government some regulatory power over foreign NGOs (Singh and Krishnan 2016). The BMGF has focussed on AIDS prevention and education in India, spending billions since it first began working in India in 2003. In recent years the Indian government has gone after the BMGF for its ties to multinational pharmaceutical companies and perceived political meddling (Singh and Krishnan 2016).

74 For example in The Philippines and eastern Europe.
Although it is no possible to verify the extent to which aid from the BMGF is given or received as a form of quid pro quo for large scale purchases of Microsoft products to be used in government departments, the implications of such an understanding are significant. If a corporation can define how governments operate through threats of withdrawing as an employer as well as through hegemonic definitions of what software is and then the philanthropic organisations affiliated with the corporation can come in and offer needed gifts in the form of ‘free’ software donations to local NGOs or direct aid, what can a sovereign government do?

As this section has shown, while it may seem self-evident that NGOs should utilise FOSS for technical, moral and economic reasons, it is not always possible. There are two main reasons for this. First is the domination of one established proprietary accounting application, Tally, which most chartered accountants are trained in and comfortable with. Secondly, the combination of Microsoft’s hegemonic position and the real need for large-scale aid offered by the Gates Foundation, make using Microsoft seem not only inevitable, but perhaps necessary. Many in the FOSS community told me that the power Microsoft and the Gates Foundation have over India is colonial in nature. Indeed, attempts by Facebook to offer access to parts of the internet to poor people for free in exchange for their personal data were also framed as colonial. Of course Facebook has framed this endeavour as an expansion of the human right to be online and connected. Helpful here is Sunder Rajan’s observation that, through debates over free market competition versus monopoly and philanthropy in Indian pharmaceuticals, that “Monopoly provides the conditions of possibility for philanthropy; yet, at the same time, philanthropy is invoked as the ethical justification of a monopolistic regime” (2011: 990).

**Conclusion**

FOSS has great potential in India. The low or no cost of FOSS combined with its inherent customisability make it ideal to meet the diverse needs of a linguistically diverse developing nation. FOSS fits well into ICTD schemas and, despite caveats that inserting technology into a community is not in and of itself necessarily beneficial, many in the Indian FOSS community are committed to mobilising FOSS for development projects. Further, the Indian government has a pro-FOSS policy and empirical research has demonstrated that FOSS offers the public sector many tangible and intangible benefits (De’ 2015). This chapter has highlighted key individuals who have worked to harness the potential of FOSS to address technical, economic, and social needs in ways that work from within and outside of the market. Such projects have demonstrated
that using FOSS not only saves money but gives autonomy to users to adjust technologies as needed. Nevertheless, this chapter has also shown the ways in which different sectors of India’s economy pay lip service to and pass over FOSS as a viable technical solution.

There are several hurdles to FOSS adoption across public and private sectors. These hurdles include conservatism in organisations which precludes taking risks. There is a lack of “brand” awareness for FOSS based applications, assumptions that costly big-name products are superior, and an “image problem” amongst FOSS advocates which aligns them with left-leaning politics. Additionally, though start-up culture is growing in India, it is harder for FOSS based companies to take off. Added to this is a potential for licencing conflicts IT companies must contend with if they wish to use FOSS. However, it is the influence of proprietary software companies, especially Microsoft, which was cited as the most detrimental to FOSS uptake in India. Several informants believe that Microsoft and other multinationals lobby government officials in the state and central government and that kickbacks are likely. Perhaps most surprising, very few NGOs take advantage of FOSS – not only for the reasons listed above – but also due to the ways in which Microsoft and other proprietary software are woven into philanthropic ventures. So in addition to the challenges associated with FOSS as a brand, within India both government and industry must balance a desire for technological autonomy with the need for jobs from multinational corporations via outsourcing and development aid from NGOs including the Gates Foundation, with its ties to Microsoft. In the final chapter I will turn to how FOSS is mobilised in resistance projects aimed at both the market and the state.
Chapter 7 – Technology, Autonomy, and the Postcolonial State

Introduction
On my last day in India I was asked to give a presentation of my research and findings at the AU-KBC. I was unsure what to say that might be interesting or useful to a group of scientists and engineers who I assumed were awaiting “results” from my year studying the FOSS community in India. I had already been asked by several interviewees if my results were ready yet. I had not even begun to process my time in India, let alone the data or what it might mean. So I gave them a version of the same talk I had given to several other groups already: what is anthropology and what can it contribute to understanding FOSS in India? I told them about all the places I had gone and people I had talked to from different corners of the FOSS community. Finally, somewhat nervously, I shared the only finding I felt confident in thus far, namely that India does not use as much FOSS as I thought it would and the Indian FOSS community does not seem to produce much FOSS, either.

During the discussion that followed Karthik, a key informant, suggested that one way to think about the lack of FOSS or even proprietary software innovation in India is as a “cultural trait” of not wanting to reinvent the wheel when it can be re-jigged as needed for purpose. He elaborated that time, energy, and resources should be used towards current societal needs, as that is a greater priority. Karthik suggested this mind-set is postcolonial in that it is a way of taking and using outside technology for internal needs without any feeling of obligation to contribute back. In effect, Karthik is proposing that by taking and using FOSS (or any technology) towards whatever ends needed or desired, Indians (both as individuals and as a nation) are enacting a postcolonial “take back” and that in India FOSS is a gift that need not be reciprocated. After centuries of Britain using technology to extract resources, and then manufacture and sell goods back to India, there is no moral obligation for Indians to contribute ‘equally’ if their energies could be better spent developing the nation. This attitude is also applicable to the wanton use of pirated proprietary software by individuals and institutions.

Karthik’s theory does speak to the postcolonial conditions in which the Indian FOSS community formed. As discussed particularly in Chapters Two and Four, many of the men who first worked to make FOSS an Indian technology were also familiar with, and some participated in,
alternative science movements which explicitly approached science and technology as postcolonial issues. Even for FOSS advocates who do not come from an intellectual background that explicitly wrestles with what it means to be a postcolonial nation, FOSS is still implicitly understood as something that should be utilised towards national goals. In this light, using FOSS for import substitution, evangelising in an effort to educate students about critical thinking, both technically and as citizens, and bridging the digital divide all can be viewed as more urgent and important than creating new software.

Framing Indian FOSS as a technology that can give autonomy to the postcolonial nation opens up productive ways of thinking through the implications of this research. In this concluding chapter I will discuss how the postcolonial context of FOSS reflects and is reflected by the parallel industries of pharmaceuticals and seeds. I will address how the case of FOSS in India speaks to issues of national autonomy in the postcolonial context, specifically with regard to resisting the pressure and power of multi-national corporations over governments. I will also explore how some in the Indian FOSS community use FOSS as a frame to understand their rights as citizens. Finally, I will also explore what this research can contribute to theories about the relationships between technology and society.

**Intellectual Property and the WTO**
In this section I will discuss how India, as a developing nation, must negotiate international trade treaties which though potentially lucrative impose intellectual property laws that can restrict access to knowledge and resources. I will outline how these regimes impact the pharmaceutical and seed industries. Then I will discuss why software patents, though potentially harmful to the Indian IT industry, are not a major concern.

**Parallels: Pharmaceuticals and Seeds**
There are many similarities between the pharmaceutical, seed, and software industries in India: they all have strong ties to MNCs and the Indian university system, they all offer significant home-grown talent, they contend with significant intellectual property issues, and they all provide MNCs with labour and possibilities for market expansion in a developing nation. However, there are also some significant differences as well: software is not as risky in terms of research and development (R&D) inputs and paths to the market as pharmaceuticals or seeds and, significantly, access to software is not a life and death issue as access to pharmaceuticals or
seeds can be. That said, access to software does have indirect health implications, as evidenced by the ways Sam was able to expand access to X-ray viewing at his hospital discussed in Chapter Six. To better understand these parallels and differences I will review anthropological research into fights for autonomy in India when it comes to pharmaceuticals and seeds.

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Table 7.1 Indian Pharmaceutical, Seed, and Software Industries Compared

In his research on the history and implications of the for-profit pharmaceutical industry in both India and the United States, Sunder Rajan has demonstrated the ways in which pharmaceutical companies have harnessed biomedical research to create drugs, profits, and a new phase of capitalism, a phenomenon he terms “biocapital” (2006). In the process of maximizing profits and offsetting the risks associated with lengthy, expensive, and minimally successful drug development, Western pharmaceutical companies utilise Indians to test drugs which, due to the proprietary nature of patented drugs, they could never afford on the open market. Thus Indians absorb risks, often without proper informed consent, without even the possibility of benefiting from any successful drugs developed from experimentation on their bodies. On the other hand, Indian pharmaceutical companies have been creating generic versions of proprietary drugs via reverse engineering which has been legal in India due to their ability to bypass some intellectual property laws as they relate to patents. While American companies can patent a molecule used to create a drug, between 1970 and 2005 Indian companies were only allowed to patent the process by which the molecule was used to create a now generic version of the same American drug (Sunder Rajan 2012: 332). This was possible because, as a developing nation, India was allowed a grace period before adhering to the intellectual property laws of WTO members. Since 2005,
when India had to allow molecules to be patented, there have been many arguments (legal and otherwise) for and against this change from within and outside of India.

Inspired by the FOSS community, the Open Source Seed Initiative, or OSSl, aims to use copyright laws that provide the rights to save and share seeds amongst plant breeders, scientists, and farmers in efforts to ensure diversity, affordability and seed sovereignty (Kloppenburg 2014). Like FOSS, the OSSl originated in the United States but it also seeks ties to the global south. And, as with FOSS, the two regions that have embraced the open source seed movement outside of Western nations are Latin America and India. Gutierrez Escobar and Fitting document the ways in which Columbian activists fight “biohegemony” through legal tactics that reframe the debates on “discovery” and “invention” of plants in ways that privilege indigenous knowledge (2016). Srinivas uses the term “biolinux” to describe how developing nations can create a “bio commons” in which agricultural knowledge can be shared and leveraged in ways that benefit farmers and citizens rather than MNCs which control over 75% of the seed market (Srinivas 2006). In India, seed sovereignty has been taken up by Vandava Shiva, a well-known environmental activist. Shiva is a co-founder of Navdanya, an organisation dedicated to fighting the introduction of genetically modified food, “seed freedom” and protecting indigenous agricultural knowledge and methods. There is general support for farmers’ rights to use seeds as needed and in May of 2018 the Supreme Court of India ruled that Monsanto patents on seeds are illegal, effectively barring the company from the country.

Activists trying to ensure pharmaceuticals and seeds are accessible to citizens use their own citizenship to question to what extent MNCs can dictate how India defines and uses intellectual property. Access to seeds needed to grow crops and drugs needed to treat illness are understandably framed as human rights. Access to software, of course, is not (obviously) a life and death matter, but it is very important to India nonetheless and some do now frame it as a human right. We will now turn to how some of the issues and debates apply to the realm of Indian software.

**Intellectual Property Law and Software**

Intellectual property (IP) can be defined as “Intangible property that is the result of creativity, such as patents, copyrights, etc.”\(^76\) and understood as legal protection issued by the state for an original creation. Of course what constitutes an original creation as well as the kind of legal protection a creation is eligible for, whether copyright and/or patent, varies over time and across political jurisdictions. The intellectual property issues associated with biotechnology, Pharmaceuticals, and software are especially complicated as in addition to regional variances the pace of technical innovation is often ahead of the law. Copyright is generally embraced as it gives credit and legal protection to innovators and, when hacked as in the case of FOSS into copyleft, reopens up the knowledge commons. Patents, however, and what they can be applied to, are more contentious.

India’s very first patent law was implemented under British rule in 1856. Several amendments were made over the next fifty years and the next major change to the patent law was the Indian Patents and Designs Act of 1911, which brought the administration of patents under management by the Controller of Patents.\(^77\) After Independence, the government commissioned a committee to review the 1911 Act so that changes to patent law addressing the changed political and economic needs of the nation could be made.\(^78\) Based on review of the 1911 Act amendments were made; the Act was reviewed and amended several times throughout the 1950s and 1960s eventually resulting in the Patents Act of 1970 which repealed and replaced the 1911 patent laws (though 1911 design laws were still in effect).\(^79\) In 1995 India joined the World Trade Organisation (WTO) and was given a ten year grace period to comply with the international IP agreement mandated by the WTO: Trade Related Aspects of IP Rights, known as TRIPs. In anticipation of the IP changes necessary to further integrate within the global economy via MNCs, several amendments were made to Indian patent law through the late 1990s. It was not until 2002, however, that software specifically was mentioned in Indian patent law.

Section 3(k) of the 2002 amendment to the Patents Act of 1970 prohibits patents on “a mathematical or business method or a computer programme per se or algorithms.”\(^80\) India’s IT

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78 Ibid.
79 Ibid.
boom which started in the 1990s was in full bloom by 2002, and some in the Indian IT sector and
many from the MNC sector who outsourced IT work to India but also hoped to sell software to
the growing middle class were in favour of software patents. The Indian argument for software
patents was that it would stimulate innovation. Further, the MNCs hoped to collect handsomely
from licence fees. Those who were against software patents, many of whom were FOSS
advocates, argued that software patents would actually impede innovation due to fear of being
sued for infringement. Indeed, many software patents are so vaguely worded that they can and
are easily used by “patent trolls” who buy up software patents for seemingly endless and
ubiquitous bits of software (for example, the up and down arrows on a website and “slide to open”
instructions for mobile phones) and then sue software companies, who had no reasonable way of
knowing if parts of their products could be interpreted as containing existing patents, for
infringement. Such lawsuits could ruin a small company. Regardless of the arguments for and
against, software patents are not required by TRIPs as the only country where they are common
is the United States.

In 2004 there was an attempt to amend the Patents Act to include software as viable for patenting
but due to pressure from the IT community the amendment was rejected by the legislature in
2005. Despite the illegality of software patents many are applied for and some granted every year
in India. Part of this has to do with confusion about what the “per se” in the Act means. In 2015,
pro-software patent guidelines were issued to the officers who review patent applications. These
guideline did not change the 2002 amendment but interpreted the “per se” to mean that some
forms of software methods or processes could be patented. Once again there was pushback and
the guideline was revised to exclude that interpretation.

One thing to keep in mind following this necessarily truncated history of Indian patent law as it
applies to software is that although it is an issue of concern amongst FOSS advocates and others,
it is not a “hot button” issue. Software patents rarely came up in conversation during my
fieldwork. Indeed, even when I interviewed Rishad, a lawyer for the Software Freedom Law
Centre in New Delhi, he emphasised many other issues of concern. One reason for this may be
that in addition to a technical-legal culture that for the most part is against patenting software,
there is a broader cultural disregard for patents as evidenced by the rampant use of pirated
proprietary software. Whether through legal means (patent law, FOSS) or illegal (piracy), Indian institutions find many ways around paying license fees for proprietary software.

Patents themselves can also be mobilised by members of the FOSS community. Early in my fieldwork, I spent an afternoon in Karthik’s office chatting with him and his friend, who is a board member of the AU-KBC. They told me about how, years back, the AU-KBC had raised funds through selling patents to an American company. Laughing, they said something along the lines of the corporation they sold the patents to being “evil.” How does one square the selling of indigenous (i.e. developed in India) knowledge to American corporations within an organisation that housed the NRC-FOSS? Although I did not ask, I believe that Karthik would say this, too, should be interpreted as a postcolonial way of using whatever tools are around towards meeting important, immediate goals. This pragmatic approach can, on the one hand, work towards counter hegemonic technologies such as FOSS while, with the other hand, sell patents to a MNC to raise needed funds.

**FOSS and Citizenship**

Between Independence and liberalisation the scope and power of foreign corporations was limited for a variety of political reasons. As a result, India did without or developed many of its own products, for example the iconic Ambassador car and ThumsUp cola. Following economic liberalisation in 1991 the ‘new’ middle class slowly but surely grew and the Indian market was inundated with a variety of consumer goods hitherto unknown. While an increase in consumer choice is heralded as a beneficial result of capitalist systems, the asymmetrical relationships necessary for capital accumulation are, of course, cited as the cost for this benefit. Although the Indian government often positions itself as an equal partner with corporate bodies, most recently with the direct foreign investment push of the Make In India initiative, many question how equal partnerships between developing nations and multinational corporations can be. In the following section I will explore how the relationships between technology, autonomy, and the state are reflected at the national and international level. I will use outsourcing and software procurement to examine these relationships at the international level. I will then explore how FOSS activists challenge the ways in which both the government and corporations use technology to infringe on individual autonomy.
Resistance to the Market
Globally, the role of multinational corporations (MNCs) has increased dramatically in the recent past to fill in for what Bourdieu termed “the abdication of the state” (1999). Considering how many services once provided by the state have been transformed into goods by the market and how this process has become globalized, it is not a stretch to term the ways in which MNCs operate in India and other developing nations as neocolonial. Outsourcing particularly has been upheld as an example of the inherently unequal relationships between nations. For example, in a discussion of the geography of ICTD, D’Costa states “Offshoring software development in Bangalore is the hallmark of a redefined international division of labour, where the partnership between Silicon Valley and Bangalore, though close, is asymmetric” (D’Costa 2011: 240). In this section I will discuss how Facebook tried to end net neutrality in India and then explore how the language of neocolonialism is used by my informants to discuss outsourcing.

Facebook’s attempt to introduce the internet to hundreds of millions of Indians is particularly relevant for exploring the Indian FOSS community’s politics. In 2013 Mark Zuckerberg, the founder of Facebook, wrote an essay in which he declared access to the internet as a human right. To that end he set up what he called a philanthropic, though for-profit, organisation called Internet.org, which was envisioned as a platform through which people in less developed nations would be able to get online for free. Zuckerberg declared “By bringing everyone online, we’ll not only improve billions of lives, but we’ll also improve our own as we benefit from the ideas and productivity they contribute to the world.” What Zuckerberg did not make clear in his manifesto was that the stripped down internet access offered by Internet.org, later renamed Free Basics, would provide access to a limited number of websites, effectively promoting Facebook and their in-country partners who would pay Facebook for the privilege of being included. This violates net neutrality, the policy of ensuring all websites are equally accessible and that internet service providers (ISPs) are not able to promote access to certain sites. Many in the Indian IT sector, even heads of large IT companies, balked at the idea of an American company dictating the terms of internet access. Many made comparisons between Facebook and the East India Company. A massive social media campaign which characterized internet access as a service not a good, called Save the Internet was organised, bolstered by a YouTube video made by a popular

81 https://scontent-lhr3-1.xx.fbcdn.net/v/t39.2365-6/12057105_1001874746531417_622371037_n.pdf?_nc_cat=0&oh=becf06b19e505e95c958a4e3753f29b7&oe=5BF11227 accessed 15/8/2018.
comedy troupe All Indian Bakchod explaining why net neutrality matters. Despite a $30 million ad campaign from Facebook which included prominent billboards and newspaper ads, mounting pressure from activists and many Indian IT companies meant that, in February 2016, the telecoms regulator officially upheld net neutrality, effectively making Free Basics illegal. When Marc Andreesen, a Silicon Valley venture capitalist and Facebook board member, reacted to the news by tweeting “Anti-colonialism has been economically catastrophic for India for decades. Why stop now?” many Indians felt vindicated in their resistance to a multinational which thought it could dictate the terms of a ‘free’ gift (Bowles 2016).

Many of my informants do or have done outsourcing work. If they can use FOSS, the pay is decent and the work itself is challenging many people in the Indian FOSS community are happy to work for MNCs. Of course it is important to make clear that very few of the people I knew in India worked directly for MNCs. Most of the work done on behalf of MNCs in India is done through a middle company which directly employees and manages the engineers. Some of these companies are large multinationals themselves such as Tata or Infosys and some are smaller companies whose sole purpose is to provide contracted IT workers.

A substantial minority of my interviewees were opposed to participating in outsourcing work. The reasons for this resistance are tied to strong feelings of nationalism. For example, Deepa, who works out of the AU-KBC Research Centre, told me that the main thing that attracted her to working with FOSS and what keeps her from seeking higher paid work at a corporation: she is not interested in outsourcing:

> Every country [has] their own knowledge people so... you use your knowledge; it would be better for the country to develop. So I’m not interested in outsourcing... here we used to do projects for Tamil Nadu government... mostly for the education system and currently we are doing [a] project for this child development and tracking system... If I’m working here... I can develop my knowledge as well as we can do something for our place, our country.

After working in the US following his PhD, Nandan returned to India to a work at IIT Bombay and has been promoting home-grown FOSS solutions ever since:

> In a country like India we often do require different solutions than from what has been applied in say Europe... but it turns out that most of the software vendors we have are based out of the West. And to their credit I must say that a lot ...of good developments

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have come out of them. However… I don't know if it's prudent for us to wait for a solution to come from elsewhere but in the least if you have access to some open source tools... anyone... who is interested can pick it up and you can have a faster kind of prototyping and getting a solution out… There are risks... this may not work well and may cause... a bit of optics to be negative but I think overall it's better to have the ability to rapidly make changes.

Nandan’s argument for utilising FOSS in India has technical underpinnings – the nature of FOSS allows for anyone with the know-how and interest to develop the appropriate software solution to a problem – however it is the national arguments I find more interesting. His call to stop waiting for Western companies to provide the “different solutions” India needs is telling. Although he does not say it as such, he is arguing for the digital independence articulated by Dinesh, though Nandan is more concerned with using FOSS to benefit Indian industry than the public sector. He admits that this approach has risks – that first attempts may not work – but that these missteps along the way are worthwhile if they lead to self-sufficiency within Indian industry.

Although some of my informants are not interested in doing work that furthers outsourcing it is important to note this does not necessarily imply a wish for pre-liberalisation economic isolation. I take their wariness of MNCs as a call for a qualified relationship between Indian public and private sectors and MNCs in which the Indian entities are real partners who are capable of providing for national interests via digital independence. In short, they see FOSS as the route to digital independence which in turn leads to the ability of the Indian government and industry to make autonomous decisions regarding entering into relationships with MNCs. India’s history of colonialism and relative isolation from early globalisation processes have created a middle class who have associated technology with modernization and development but who have also always had a healthy scepticism of Western governments and corporations trying to define what modernity and its attendant technologies should look like. So although the hegemony of companies like Microsoft and Facebook is strong, counter hegemonic resistance to what is perceived as neocolonial rule is also significant. After all, it was the British East India Company and not Britain that first colonised India

Resistance to the State
In addition to using FOSS as a means to digital autonomy vis-à-vis MNCs, many Indian FOSS activists see FOSS as integral to fights for citizens’ rights, particularly when it comes to online access and privacy. As discussed in Chapter Two, the Indian FOSS community and the Software
Freedom Law Centre particularly have rallied around what they consider to be government infringement on civil liberties. As well, much of the evangelism aimed at engineering students by left-leaning groups such as the FSFTN discussed in Chapter Three addresses technical surveillance and students’ rights to digital privacy. Below I will highlight some of the ways the Indian FOSS community wrestles with what they consider to be government overreach.

Though not brought up often in interviews, one issue that several Indian FOSS groups rally around is internet shut downs. According to the Software Freedom Law Centre, state governments in India are using internet shutdowns to prevent or respond to civil unrest, broadly defined to include political instability but also for less serious issues such as to prevent exam cheating.\(^83\) Perhaps not surprisingly there are more shut downs in regions where there are ongoing political conflicts such as Jammu and Kashmir and several of the Northeast states. In response to the increasing frequency of shut downs, the Indian government has shut down internet over 250 times since 2012, the SFLC has launched a website ‘internetshutdowns.in’\(^84\) to track and link commentary and resources for reporting shutdowns. Although, as discussed in Chapter Six, much of India is not yet online much of it is and these shut downs not only impinge upon citizens’ rights to information in a democracy but also disrupt government and business sectors which impact thousands if not millions of citizens.

Most of my informants had not been directly affected by shut downs while I was in the field but I have been following a few of the groups I worked with and in May 2018 the FSFTN got actively involved in the issue. In May of 2018 police shot and killed 11 people protesting a copper smelter responsible for environmental pollution in rural Tamil Nadu.\(^85\) Following the shootings the state government attempted to quell public uproar by ordering Internet Service Providers to shut down all mobile phone and broadband internet services in three districts. On 30 May an FSFTN activist posted a video criticizing the move and explaining how mesh networks can be deployed to prevent citizens from losing internet access. The next day more activists posted calls to start mesh networks in the state and a training session was set up for 2 June.\(^86\) I relate this

\(^84\) https://internetshutdowns.in/ accessed 31/10/2018.
post-fieldwork example because it so clearly shows how FOSS is being used to resist government when deemed necessary.

While internet shutdowns have been increasing in recent years, according to many of my informants the most dangerous threat to citizens’ privacy rights in India is the government’s Aadhaar program. The Aadhaar program uses a unique identification number for each citizen that includes not only their name, age and address but also their religion as well as biometric data consisting of fingerprint and iris scans. This number is increasingly used for receipt of government food subsidies as well as for personal financial transactions such as opening a bank account. Currently there are about a billion people with Aadhaar numbers. Critics of Aadhaar claim that the system is far from fool-proof. They cite several high profile cases of Aadhaar related fraud in which Aadhaar numbers were created for people who are no longer alive. Further, they argue that the Aadhaar database is easy to hack into to collect personal information about citizens, and that the machines used to verify fingerprint and iris scans are unreliable, resulting in vulnerable citizens not being able to collect benefits, including food.

While criticism of the Aadhaar project was near universal among my informants, there were a few exceptions. Dinesh, who works for an Indian software consortium committed to supporting home-grown software, iSPIRIT, sees the project differently because he sees Aadhaar as a mechanism that allows for financial inclusion. He told me that in addition to the one billion citizens with an Aadhaar number about 300 million Indians have smart phones and bank accounts. He told me that as the group of people with Aadhaar, a smart phone, and a bank account grows so too does financial inclusion. He explained that currently if you apply for a loan at a bank they will send someone to your home with paper forms to fill out and verify all your credentials – your passport, bank card, and proof of address. This costs the bank about Rs 1000 and the process takes at least seven days to approve a loan. He said that if the process is done electronically it will take minutes and cost only Rs 60 and that iSPIRIT projects that increased volume could bring the cost down to 5 rupees. Dinesh hopes this new system will lead India from asset based lending to data driven lending, which he feels would be transformative for

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people like Uber drivers who may not have assets, but can demonstrate six months of steady cash flow, indicating they will be able to repay a loan. Dinesh also emphasized that because the “India stack” is being utilised for Aadhaar that it is open source.

Unlike Dinesh, most of the people I met in the Indian FOSS community were sceptical if not outraged by the Aadhaar project. Deepak, a professor in Mumbai, articulated a common concern that the software will give the government powers it should not have: “When digital technology is used by the people for distribution of power, it’s a different thing. But if you use it to make the powerful more powerful... They have access to your personal information. They have access and the ability to do big data analytics. To map people. To map what you’re doing.” He said it is bad enough that some organisations such as Google already do this but now the Indian government wants to do this as well. When asked why this is a problem, Deepak replied:

They’re not kings of the past. ...we just have them for certain domains, making sure that the human rights are given but they are snatching this human right, right in front of you. In India the argument of privacy is very difficult to talk about because… the people don’t care, they don’t even think that privacy is a fundamental right. They don’t have an awareness.

Deepak’s concerns that the government will use technology to limit civil liberties were common. In fact, Nitesh who heads an NGO in Bangalore told me that because it will enable a surveillance state, Aadhaar is an “evil” project. Nitesh explained that to understand how the government was able to make Aadhaar you need to understand how the Indian software industry has become complicit in the Aadhaar project and, he said, to understand that you need to understand iSPIRIT. As he explained it, in the last ten years the Indian software industry has tried to shift away from services companies focussed on outsourcing towards creating Indian product companies and this shift has been led by iSPIRIT. According to Nitesh, iSPIRIT supports the Aadhaar project because the success of a number of their projects is tied to the success of Aadhaar. Further, Nitesh accused iSPIRIT of “open washing,” analogous to “green washing” because they claim that the India Stack (a software “stack” is set of programs connected to work in tandem) used in Aadhaar is free software in order to get endorsement from the free software community. They want this endorsement because many in industry now consider free software developers technically better and more elite than proprietary developers. However Nitesh said two of the most critical parts of the software used for Aadhaar, “the important bits,” are in fact proprietary.
As with internet shutdowns, the Software Freedom Law Centre is also fighting Aadhaar. I asked Rishad, a SFLC lawyer, about the case against Aadhaar and he told me that the Supreme Court said you cannot enforce Aadhaar to receive benefits from the government but they have found many violations, which are listed on their website. He also explained that India does not have a privacy bill as such so they are working to help create one.

Although the majority of the people I knew were against Aadhaar, as Dinesh shows, the Indian FOSS community is home to different ideological positions. I think an important take away from the differing interpretations of the implications of Aadhaar is that they represent differing visions of how the government should best utilise technology. While the minority view, at least among the FOSS people I knew, Dinesh’s argument that the linking of personal data should be leveraged to bring more Indians into the digital banking represents an extension of iSPIRIT’s mission to use technology as a “magic bullet” that will bring about positive social change. Thus the pro-Aadhaar side reflects a neo-liberal approach to development that assumes market driven technological inputs are necessarily good and that the role of government is to facilitate the market. On the other side, the anti Aadhaar arguments are based not on criticism of the government directing technology policy per se but on how, exactly, the government is exercising its powers. The resistance to the Aadhaar project in the Indian FOSS community speaks to a commitment to personal autonomy akin to that of Western FOSS advocates. However, there are significant cultural and legal differences when it comes to civil rights in India versus the United States. Lastly, despite the different ideological underpinnings of the pro and anti Aadhaar arguments, it must be recognised that both camps’ arguments are rooted in sincerely held beliefs about how to best develop the nation.

**Concluding Remarks on the Relationship between Technology and Society**

To conclude I want to come back to some of the issues raised in the introductory chapter both in terms of the demographic make-up of the Indian FOSS community and the wider implications of FOSS as a technology within political and economic contexts. By discussing these two levels of analysing FOSS in India I hope to demonstrate how this study contributes to anthropological

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89 The legal status of Aadhaar has been argued in the Supreme Court for years. The most recent ruling in September 2018 has struck down some uses of Aadhaar, for example for minors and to open a bank account, but upheld others, for example to file taxes and receive a Personal Account Number (PAN). For a breakdown of the most recent ruling please see: [https://sflc.in/faqs-aadhaar-judgment](https://sflc.in/faqs-aadhaar-judgment) accessed 1/11/2018.

study of technology as well as to wider debates about the roles technology does and could play in contemporary life.

For the most part, the Indian FOSS community is left-leaning and middle class, though there are significant generational, regional, and gendered differences. The older generation (aged 50 +) is almost exclusively upper middle class and Brahmins are well represented. Many from this first FOSS generation work (or used to if they are now retired) as professors or as directors of NGOs or government departments. Many of this generation have studied abroad and/or have children studying or working abroad. The younger generation, in their 20s and 30s, are most likely to be students or employed by IT companies, though there are a few entrepreneurs as well. Not only is the FOSS community overwhelmingly middle class, it is also overwhelmingly urban. Keralites have been especially active in promoting FOSS within their home state and at a national level. Within southern India there are strong ties to politics, both in terms of political parties and political activism. Members of the FOSS community in northern India were not as politically engaged as their southern counterparts but this is not to say they are not politically aware or active. Within Mumbai I found a stronger emphasis on industry and entrepreneurship than I was aware of elsewhere. Throughout the Indian FOSS community women are under-represented.

By highlighting the sociological aspects of the FOSS community we can better appreciate both the way it is mobilised as an ethical practice that is intended to shape the nation but also the limits technology has in shaping social life. In general, class, caste and gender inequalities are maintained in the FOSS community. That said, many members of the community are sincerely committed to making it more inclusive. The case of FOSS in India offers an excellent lens through which to view how one type of technology, software, can be used to in both hegemonic and counter hegemonic ways. It also points to the insufficiency of previous accounts of the FOSS community as transnationally homogenous.

Given the relatively elite class positioning of software engineers it is not surprising that the FOSS community in the West can, on the one hand, champion a technology that has counter-hegemonic properties but, on the other hand, see the technology as apolitical. Where anthropology of FOSS in the West finds that the FOSS community is defined by contribution through technical practice which are conceptualised as expressions of freedom, in India the FOSS community sees technical practice as necessary but not sufficient. This is because freedom
in India is not centred around a utilitarian ideal of individualism but upon a relational individualism in which the individual conceives of themselves as part of and responsible for/to a web of relations. Thus, while technical contributions are important, so too are social contributions which easily fit into a tradition of middle class volunteerism aimed at nation building, broadly speaking.

Although Indian software engineers occupy similarly elite class positions to their Western counterparts, FOSS offers Indians the possibility of exerting autonomy in relationships between technology and the state. Autonomy via FOSS is expressed on three levels: personal, as a citizen, and as a nation. Autonomy on the personal level is represented by the technical freedoms inherent to FOSS, which are well analysed in previous studies of FOSS. The different ways FOSS allows for the autonomy of citizens in relation to markets and states as well as the autonomy it allows states in relation to the market have not been widely studied. The Indian FOSS community has taken a technology created in a Western context and mobilised it towards what can broadly be called nation building efforts which include but are not limited to: transparent technical infrastructure that enhance civil liberties and democratic governance; educational interventions that 1) make for better engineers and 2) disrupt rote learning models in ways that encourage critical thinking; bridging the digital divide with regard to access to technology and providing technology in Indian languages; and encouraging development of home grown industries. All of this is taking a technical practice and redefining what the ethical horizons of the practice are.

However, the extent to which these mobilisations of FOSS will lead to substantive societal change are yet to be seen. Certainly the potential is there, but there are many hurdles to FOSS adoption in India and the politics of engineers have rarely if ever led to dramatic political change. Writing at the dawn of the twentieth century Veblen (2006) had an optimistic view of the potential of technology to improve the quality of life and high hopes for engineers, indeed he envisioned them leading a socialist technocratic revolution in which social good and efficiency were valued more than profit, which he felt was an inefficiency of industrialists. Marcuse, too, saw great potential for what he called “technics” or the actual technologies that could be used towards social control or liberation (1998). Nevertheless, as Noble (1977) reminds us, despite much potential, as middle class professionals engineers have mostly been content to serve the
goals of their employers. Yet, the uses of software and IT in recent social movements and by groups such as Anonymous to disrupt what they perceive to be coercive uses of political power signal a shift in engineers’ allegiances. This is a shift many of my informants wish to be a part of.

Throughout the thesis I have shown what the case of FOSS in India can tell us about how a technology can be interpreted and mobilised differently than in its place of origin. This is not revelatory in and of itself as historians of technology have demonstrated that cultural context shapes technological uptake (e.g. Baark and Jamison 1986; Williams and Edge 1996; Medina, Marques, and Holmes 2014). Ideas themselves are shaped by cultural context as De Roover et al. showed that the so-called “freestanding” principles of liberal political theory cannot be transplanted into India with the same interpretations and applications as in the West because of India’s unique history and cultural contexts (2011). My findings are not even revelatory for FOSS as Chan (2004) demonstrated in her ethnography of FOSS in Peru. I do think, though, that this study does contribute an important intervention in the anthropological study of FOSS specifically and technology more generally.

By attending to the sociological aspects of the FOSS community as well as the wider political, economic, and historical contexts of technology in India I have demonstrated the ways in which FOSS in India represents both similar and different concerns than it does in the West, where it was first developed. Specifically I have showed how this technology was taken up in the context of massive socioeconomic change by a group of elites who are cognizant of postcolonial issues and committed to Nehruvian nation building. In so doing I hope I have been able to demonstrate the value in including such contexts in the analysis of technologically concerned communities that can then benefit and expand the anthropology of FOSS not only in other developing nations, but in the United States and Europe as well. Indeed, I see the contextualising of technology within political, economic, and sociological contexts as a corrective for much of science and technology studies (STS) which, despite its many valuable insights into the ways in which technology is created and understood, overly focusses on analysing circuits and flows of power all the while gliding over and around the structures that create, maintain, and reproduce power. Rather than describing how different actors are connected within networks which constantly, simultaneously reshape themselves, by showing how technology has developed and been
wielded in different times and places to different political and economic ends we are better equipped to work towards mobilising technology for a different and more equitable future.
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