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Ser Técnico: Localized Technology Transfer, Emerging Technical Actors, and the
Brazilian Computer Industry

Abstract: In considering technology transfer in the Global South, Brazil's recent upsurge in open-source software development raises the historical question of how disparate ideological conceptions of nationalism, market censorship, and innovation have played a role in the dissemination and adoption of what we now consider universally acceptable technology: computers. Through a case study on Brazil's "indigenous" or "hybrid" computers, I build a media-historical analysis that starts with Brazilian military protectionist policy encouraging the local development of computers during the 1970s-1980's. I then lead up to the current cultural, political, and technological climate of global-minded free/livre open-access software (FLOSS) to argue about the various "local" valences of technology transfer. Ultimately, I contest the reductive idea of a "trickle-down" model of technological adaptation by introducing various technical "actors", or *seres técnicos*, who emerge in Brazil to address needs rising from specific technological moments to explore larger rhetorical ideations of labor, free speech, and knowledge production.

In a statement issued as both a critique and a challenge, former Brazilian president

Luiz Inácio "Lula" da Silva asserts, "While society has entered the digital era politics has

remained analog."[1] His opinion addresses the social divide between technological

advancement and the state's ability to tap into technology as a platform for effective

political action. Introduced in 2005 as the first state-sponsored campaign in support of

legal practices of open-source software, Lula's initiative aims to introduce Brazilian

citizens to technology education to engage in interactive, "participatory" politics within a

networked democratic culture. Brazil does not have an ideological history, however, of

associating technology's generative qualities with democratic ideals or social utopia. In

fact, the country is a relatively new democracy, and the first of its technology-oriented

policy regarding computers emerged in the midst of a military dictatorship in the 1970s.

Furthermore, the idea that the technology policy regarding open-source software in Brazil

allows the state to enter a "digital" era invites a rhetorical contrast that labels the

country's prior investment in computer-oriented technology transfer as outdated, or

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[1] da Silva, Luiz Inácio Lula. "The Message of Brazil's Youth." *NY Times*, Jul. 16, 2013.

perhaps "merely" analog. The rhetoric concerning the local production of computer technology, its transfer between international markets, and the State's protectionist role in gate-keeping the market during the dictatorship is decidedly far from the tone that the prior president takes in the present. Consequently, the contemporary climate of political advocacy supporting open-source software communities, followed by the ideologically charged rhetoric of democratic, non-proprietary, and participatory technology use owes its historical roots in large part to one of the most politically and economically restrictive eras of Brazilian history: the military dictatorship from 1964-1985.

I initiate an historiographic analysis of Brazil's evolving computer technology policy—with approaches that follow the trajectory from hardware to software—to debunk notions of streamlined technology adaptation that neglect the larger historical, economic, and political frameworks of global North-South power relations and inequalities in differentiated user experiences. In this work, I address a growing body of media studies from both producer and user perspectives (Larkin 2010, Burell 2012) by looking specifically at Brazilian computer policy and technology transfer and by considering analyses of how international sites locally receive and adapt specific technologies and technological practices (Radway 1988, Appadurai 1990).

Part I. Historical Background and Theoretical Stakes:

The initial steps Brazil made in regards to the technology transfer and local production of computers took place in the early 1970s, manifesting as state-driven technology policy emerging from a set of national security concerns. At the time, the Brazilian Navy was operating its ships using British Ferranti computers, a fact which

triggered the military's growing awareness of its dependence on foreign technologies, which according to sociologist Peter Evans "became thereafter a central justification for the national computer policy" (Evans, 69). Without attempting to conflate the trend from proprietary hardware towards programmed software—mirrored at times in somewhat convoluted and bureaucratically wooly terms—I argue that Brazil's evolving technology policies historically, politically, and ideologically set the ground for a robust software culture to take root in the present. These conditions of possibility emerge precisely because Brazilian policies issue standards on 1) international technology transfer to open the market to Brazilian consumers, and 2) foster protectionist measures for local computer production to provide an incubating space for Brazilian innovators (Tigre 1983, Evans 1986, Schwartzman 1988). In addition, I argue that this multivalent approach in policy-making formulates the idea of the citizen as end-user and producer respectively, a political subject formation crucial for the contemporary understanding of Brazilian open-source software culture today.

Initially the military state did not consider this double-pronged policy as a means for opening conditions of political freedom. However, because of the state's ongoing political, economic, and innovation instabilities, agents of Brazilian technology policy were careful to include both potential outlets for Brazilian end-users (technology transfer from MNCs) and Brazilian producers (protected local industry) (Schwartzman 1988). Nearing the regime's end in 1984, Brazilian social scientist Simon Schwartzman observes that a "national policy for informatives" got approved because it addressed the "dilemma between national autonomy and self-determination, on one hand, and control of the country's resources by international companies and their local associates, on the other"

(Schartzman, 67). On the actor-level, conditions of technological restriction and economic dependency had thus far constrained individuals who would fit the mold as Brazilian technology producers—university researchers, technicians, engineers, among others—from finding state resources to contribute to the growth of a local computer industry. The protectionist policy enabled the state to safeguard local computer production enough to encourage the emergence of national computer products, but the policy alone was not sufficient to steer and sustain such technological developments into a state of self-reliant production and fiscal independence.

By the 1990's, Zelia Cardoso de Mello, the Economy Minister at the time, charged such laws with hindering the country's economic growth into an international scale of technological competition. She claimed that Brazil was "effectively very backward because of this senseless nationalism" and argued that this "computer problem effectively blocked Brazilian industry from modernizing. It does not make any sense to retain this cyst, which is the computer market reserve" ("Brazil Backing Computer Imports"). In response to such a critique a São Paulo deputy named Fernando Gasparian spoke for the 60,000 people working in the domestic computer industry, "We are opening in exchange for nothing", and that the local technology experts would ally with nationalist lawmakers because an "opening could kill our computer industry" (Ibid). The moment of opening the technology market marks a series of conflicting interests. First, the State, which had been such an active proponent of market protectionism in the 1980's goes so far to remove itself from its prior position, calling the local computer industry a "cyst" and a "problem" that holds the nation back from becoming a legitimate, international competitor. Second, the emergence of a nationalist body of technological

experts, who had surfaced at first to negotiate very material and economic restrictions

with the possibility for new political formations in a vanguard, insurgent light now appear

regressive, "backward". Finally, the national technology market itself is portrayed to have

outgrown its incubating stage, and to remain further in a protectionist state would not

prove that a local industry is viable on an international scale but rather, evoke instead

"senseless nationalism. " This moment illustrates a transition in the historical trajectory

of rhetorical positions that various technology experts and activists, market actors, and

the State assume during the period phasing protectionism out to make way for the "open"

market. Such rhetorical stances allow for the coexistence of what at present seems like

contradictory aims. On one hand, a local identity of technological innovation emerges in

Brazil that foregrounds the contemporary investment in open source software as a

national enterprise. On the other hand, such support falls under suspicion for donning the

guise of technological innovation and freedom in favor of neoliberal advancement.

It is already clear that a reductive model of "trickle-down" adaptation does not

accurately depict Brazil's historical engagements with technological development. To

unpack the various rhetorical, technological, and political investments undergirding the

local production of computer technology in Brazil, I explore the iterations of technical

"actors" as subject formations that raise larger questions about technologically-mediated

labor, political possibilities formulated in innovation economies, and cultural institutions

as gatekeepers of knowledge production. I historically frame the actors who help

introduce local computer production in Brazil, and how their roles within the policy and

practice of computer production evolves from the 1970's to the present in response to

changes in political regimes, economic restrictions, and emerging innovations across

international markets. First, the programmers, developers, and coders refute dependency theory that marginalizes Brazil's capability to produce software to the economic, political, and cultural periphery. Second, this class of technological producers, or "frustrated nationalists" (Evans 1986) becomes enmeshed—and at times romantically conflated—with the already-existing creative class as "ideological guerrillas" through the state's established technology and cultural policies (Alder 1986). Finally, this evolving class of technological actors involved in Brazilian computer production becomes ideologically political, as "insurgent experts" (Shaw 2011), thus setting the precedent for contemporary dialogues about the digital divide and the participatory promise of open-source software. The advent of "indigenously designed" computers (Evans 1986), state-sponsored hybrid companies, "power brokers" (Castells 2009), and technical specialists created the local computer market prior to the hackers and programmers embedded in open-source software communities, pointing to the historical precedence preceding software production as an "emerging" technological culture in Brazil (Williams 1976). While these particular subject formations are contingent upon their historical moments, I call this transforming cast of technological actors *seres técnicos* because their positions within the Brazilian landscape of technological innovation are expressed and therefore defined in part by the ideological and political positions they conceptually assume and nurture. To borrow from Julian Orr's *Talking About Machines*, I assert that these technical subjects express a human mental activity of labor as *situated practice* that is "socially and materially located" and that these "actions [as] practice must be understood with reference to the situation of their doing" (Orr 10,11). Furthermore, what defines a moment of situated practice for the Brazilian actors engaged in such practice as expertise

and knowledge production changes within the country's shifting technological, political, and economic terrain.

Part II. Technological Actors:

At first, technical experts and professionals fell under the purview of the military state, whose protectionist stance conceptually mirrors what Paul Edwards calls the American 'closed-world' ideology to "describe the language, technologies, and practices that together supported the visions of centrally controlled, automated global power at the heart of American Cold War politics" (Edwards, 7). Edwards argues that computers "[allowed] the practical construction of central real-time military control systems on a gigantic scale... [facilitating] the metaphorical understanding of world politics as a sort of system subject to technological management" (Edwards, 7). Brazilian protectionist ideology does not enact quite the same idea of the containment expressed by Edwards in regards to American power, where Brazilian policy emerged in response to charges leveled against the country of its dependent status. Dependency theory emerges out of Marxist theorizations of nation-state economic, political, and ideological statuses of influence, where traditionally, the "center" carries hegemonic influence over "peripheries," with the United States and other Western nations heading the front as centers in the contemporary climate of world-system capitalism (Cardoso & Faletto, 1979). Former President Fernando Henrique Cardoso and Enzo Faletto's seminal work *Dependency and Development in Latin America* challenges the idea of distinct and separate dependency dimensions by addressing the coexistence and entanglement of two situations: "dependency where the productive system was nationally controlled, and

dependency in enclave situations" (xviii). In regards to dependency theorization in Brazil,

Cardoso and Faletti draw attention to the need to look beyond "whether power is

exercised by local entrepreneurs or by 'enclave' types of foreign companies" (xviii). The

historical emergence of actors from both local and 'enclave' factions of early-stage

Brazilian computer production requires that I also address what the "*relationship* between

these two dimensions is, and what their interaction is with capital accumulation on a

global scale" (xviii). Subsequently, "frustrated nationalists" involved in technology

policy and expertise within the military regime carry out and contest this entanglement in

relationships of dependency.

Nationalist dissatisfaction with the dearth of domestic technology production

surfaced to contrast the prevailing practice of favoring multi-national corporation (MNC)

technology transfer when military concerns of national security coalesced with university

and specialist desires to build local production of computer technology and move beyond

technology dependence. MNCs with already extant subsidiaries located in Brazil such as

IBM did not see the advantage of fostering local talent and expertise for the national

production of computers. In fact, according to sociologist Peter Evans, MNCs were "not

just uninterested", but also ill equipped "to deal with such proposals from Brazilians"

(Evans, 792). From the perspective of a Brazilian would-be producer, the options were

slim: they could either attend graduate work abroad and attempt to find work there, or

stay at home and sell foreign computer goods to other Brazilian consumers. The

frustrations seeped through various institutions: university experts "could invent and

build prototypes, but there was no way of transforming their creations into products, no

way of seeing them produced and used" (Evans, 792). Likewise, a number of technicians

who sought graduate work abroad and returned to Brazil "were aware of the completely different environment that might be found in places like Silicon Valley, the idea of a local computer industry was not an abstract ideal" (Evans, 792). Finally, those qualified to work in a technical capacity also found that "subsidiaries of MNCs seldom employ local people to perform high-level technical functions such as product design and engineering" (Tigre, 3). Alongside growing state concerns for nationalist and militaristic self-sufficiency, "the modernization of Brazilian higher education and of the labor market generated a group of 'frustrated national technicians' with strong personal and ideological interests in the creation of a local computer industry" (Evans, 792). As a result, when policy-makers gathered to implement the incipient stages of a nationalist technology policy program, they were positioned to address the issues raised by these frustrated national technicians.

The accompanying emergence of technology-sector policy-makers dovetailed with these frustrated nationalist technicians at the time on account of the State's decision to incorporate governmental use of computers. While the decision was expressly stated as an administrative decision, it also coincided with "the modernization of Brazil's military machinery", which led to the Brazilian National Development Bank (BNDE) to collaborate with the Navy in 1972 to create "Coordenação das Atividades de Processamento Electrônico", or CAPRE (Evans, 793). Brazilian frustrated technicians who had prior belonged to fragmented groups of specialized experts without proper institutional anchoring "emerged with processing and some hardware expertise, and an awareness of the disadvantages of relying on distant suppliers" (Evans, 793). Within the political institution of a military regime, these technicians seized the institutional

opportunity the state gave them and partnered with policy-makers and state advocates to introduce what Emanuel Adler calls "pragmatic antidependency" (Adler 1986). This mixture of policy advocates and technical experts comprised Adler's group of "ideological guerrillas" who "used their scientific, technological, and managerial knowledge, as well as their access to political power, to mobilize not only the *know-how* and *know-what* but also the *know-where-to* regarding computers" (677). They embodied a particularly Brazilian ideological mixture of "nationalist beliefs... and Marxist humanitarian and egalitarian values, which derives from a strong indigenous statist tradition" (Adler 675), rather than ceding to the "generalization that TNCs have greater bargaining power in industries [of] rapidly changing proprietary technology" (Evans, 803).

The ideological guerrillas made longstanding implications in the history of technology policy and transfer in Brazil, and the conditions for the local production of technology in the present. First, institutionally, the policy stance that the ideological guerrillas advocated towards international technology transfer and nationalist computer production joined the state's protectionist policies with a "successful bargain" on ideology that "turned into a strategy for achieving change, that is, for overcoming dependency" (Adler, 675). Directly refuting dependency theory that would illustrate Brazil as a developing country with a modernizing economic and infrastructure crumbling under a militaristic regime, the ideological guerrillas refuted the dire image of MNC technological dependency. They did so no less through the dogged work of actors working through the state apparatus, where "the key initiators in this story are middle-level technocrats, not central policymakers" (Evans, 805). Discursively, these ideological

guerrillas embodied "the idea that technological change also offers certain moments of transition which may provide Third-World countries special possibilities to breach the defenses of otherwise impenetrable industries" (Evans, 803). Finally, they were able to observe state incentives towards making joint investments in the Brazilian technology market's end-users and producers as an accurate projection of the industry's move from mainframe hardware to networked software.

The longstanding contributions that the ideological guerrillas made to Brazil's contemporary technology policy and transfer reside in part with the temporal coinciding that their political emergence had with the developments of the international market for computers technology. As Brazilian economist Paulo Bastos Tigre notes as early as 1983, among the international developments a prominent trend was the "sharp increase in demand for software services is supporting the development of independent software houses which provide application software products and consultancy services" (Tigre, 59). Furthermore, in the early climate of software production, Tigre argued: "Software houses in Brazil compete directly with foreign software suppliers, as software packages can be imported freely. Software imports are very difficult to control" (Tigre, 63). Tigre observed the rising importance associated with programming expertise: "With programming becoming increasingly important in system development, independent software suppliers, known as system houses, are gaining increasing importance in the computer industry" (62-63). The rise of an expert market to mediate programming difficulties with a mass adoption of user-friendly computers led then to practices that veered on the illegitimate side of both state and international market-sanctioned practices, as Schwartzman observed: "Public domain software is nonexistent and not planned;

smuggling and illegal copying, however, are widespread" (72). Tigre, among other

scholars, asserts that the rise in demand for software through legal or illegal means arose

"in Brazil since the introduction of minicomputers" because the end-user at the time had

"no prior experience in data processing" (59). From the mini- to the microcomputer,

Schwartzman notes that the introduction of newer computational models generated a

whole new user-oriented computer industry, in which the switch from "the producers' to

the individual user's point of view" would prove to be more and more crucial

(Schwartzman, 80). A November 24, 1980 release from the now-defunct *Computerworld*

seemed to confirm the emergence of a new user base dependent on the local computer

industry's byproducts: "new computer users who have never before felt the need for DP

(domestic product) embrace it in order to become competitive in a changing economic

environment. The bulk of Brazilian computer customers are first-time users who naturally

start with a mini" (22). The ideological guerrillas from the 1970s-1980s accomplished an

ambitious political move by taking a specialist concern about domestic computer

production and attempting to turn it into a nation-wide market by providing expert go-

between software services for new users of the microcomputer. To build upon the

contributions of the ideological guerrillas, I argue that the community that Aaron Shaw

calls "insurgent experts" invested in open-source software draws historical roots whose

precedence travels past the 1990's and into Brazil's genealogy as a military state invested

in protectionist computational hardware.

   In part, the question relates to historical accounts of political changeover: how did

the ideological guerrillas fare with the switch of political regimes in the 1990s from

military dictatorship to socialist democracy? Shaw details the change in actors from

technician specialists under protectionist control to the rise of insurgent experts amidst an unsteady capitalist democracy. He observes that the desire for nationally developed computer technology that survives intact mainly because the ideological stakes become *repoliticized* through the switch in technocratic governance. Before, specialized technicians worked within a military regime to combat dependency theory that situated their employ locally without the resources for computer production, and internationally as simplistically dependent on technology MNCs. In contrast, however, the insurgent experts of the 1990's inherited this political legacy and worked to "create counter-hegemonic alternatives to neoliberalism from within the same institutions that drove neoliberalism's historic advance in the first place" (Shaw, 256). Championing *Free/Livre Open Source Software*, or FLOSS, the policy's advocates were a new breed of "politically empowered experts utilizing technocratic governance institutions to *repoliticize* IT and informational capitalism" (256). For nationally renowned programmers and technology activists who came of age during the dictatorship, like Mario Teza and Sergio Amadeu da Silva, FLOSS summoned Brazilian flavored anti-capitalist left ideologies, unlike the concurrent open-source movements in North American and Europe, which "shared an apolitical or libertarian professional culture" (259). As a result, the idea of the Brazilian technology producers transitioned into the current manifestation as FLOSS advocates positioned as counter-hegemonic, insurgent experts through "self-representation and practical action aimed at dismantling neoliberal policy from within the state" (267). In an attempt therefore to escape from the State's intentions to capitalize on the open computer market, these insurgent experts found

technological and political affinity with the coinciding rise of the international FLOSS movement.

The switch towards unraveling the neoliberal policy that emerged internally during the regime reflected the same demographic of Brazilian experts and graduates in technical fields who would have been ideological guerrillas in the prior era. In fact, this ideological re-positioning was seen by these insurgent experts as "a continuation of political struggles for national development, economic equality, and access to informational resources" that were consistent with "personal experiences in the labor and student movements under the dictatorship" (267). Then, historically the FLOSS insurgent expert presents a subject position—what I call the *ser técnico*—that embodies the historical trajectory from the Brazilian local producer who then evolves into the political end-user in the contemporary iteration of the hacker or the technology advocate. The first condition of possibility that enables the ser técnico to emerge addresses the frustrations of nationalist technicians concerning the dire lack of state support and resources to consider a space for Brazilian producers at the same time that it severely constrained the Brazilian end-user under protectionist policies. The ideological guerrillas embody the second condition of possibility: they were able to make joint investments that colluded with concurrent state incentives for both the market's end-user and producer perspectives, all the while moving the industry to match the international push from hardware to software. The "history" of software in Brazil—let alone other Western, First-World countries—is an under-explored and under-archived field. The emergence of FLOSS and other technological innovations seem to point to the fact that the Brazilian technological

subject as end-user and producer—conceptualized historically as separate roles—seems

to be moving towards a rhetoric of cohesion between the two positions.

Part III. Policy and Products:

Another way to trace the historical trajectory of local technology innovation and

international technology transfer in Brazil is to consider the rise of political ideologies

concurrently with exact policy and product releases. By mapping the various products

that emerged as a result of the local computer industry, a media historical perspective on

how experts, policy-makers, and end-users engaged with the production, distribution and

subsequent politicization of computers can shed light on their technological adoption in

Brazil. Specifically, Brazilian consumers and producers were introduced to an end-user

computer market in the midst of a military dictatorship and the rise of economic

dependency theory through the state-encouraged production of "indigenous computers"

such as the G-10 microcomputer, or its colloquial name, the *patinho feio* ("ugly

duckling") (Evans 1992). The G-10 was the result of the Brazilian Navy's collaboration

with the Engineering School at the University of São Paulo (USP) and a software group

at the Catholic University of Rio de Janeiro (UCRJ), which was then used by the two

schools in 1976. This hybrid collaboration between universities and the State's military

interests was quite common at the time: "The involvement of university departments in

the early days of the computer policy gave it strong ties with the university community,

which helped provide it with technical competence and legitimacy" (Schwartzman, 70).

The G-10 embodied the move to insulate the Brazilian computer market against

multinational corporations (MNCs) because of their affect in not only a consumer market

based on the creation of the first Brazilian end-users, but also in the labor practices of local computer production and innovation. First, by exercising hegemonic market power in developing countries, MNCs prevented "indigenous firms from entering their own home market, the role of technology imports in inhibiting local research and development (R&D) efforts and foreign control over licensing agreements," which at first prevented a "real transfer of technology to the Third World" (Tigre, 3). Beyond the macro-lens of institutional constriction; however, a few of the already established MNCs with subsidiaries in Brazil were "not interested in either developing or absorbing local product development efforts" (Tigre, 66). The rallying cry around an "indigenous computer" could be heard in the rhetoric of many a frustrated nationalist technician during that era.

While the initial rhetoric in Brazil's early technology policy regarding technology transfer and the local production of computers was protectionist, many of the early iterations of a local computer were the product of hybrid companies, which were commonly referred to as *tri-pés*. In Peter Evans' "State, Capital, and the Transformation of Dependence," the renown sociologist "'We were trying to protect a copper mine (the mini) and we ended up protecting a diamond mine (micro)'" (Evans, 799). The precise developments in the international market for computer hardware and, correspondingly, technology transfer in Brazil in the 1970-80s depicted a move from minicomputers to microcomputers with their central processing units (CPUs) run on microprocessor chips. This in turn indicated a switch in focus from wholesale mainframe computers towards computers run on micro-chips were outsourced to semi-conductor companies such as Intel and Motorola producing CPUs on an outsourced, merchandise basis (Evans, 798). The outsourcing of specific parts of the computer facilitated corresponding moves within

the local market, Understanding fully that "[although] the characteristics of computer

technology offers opportunities for new market entry, the nature of the computer *market*

does not encourage new ventures," technology experts and policy makers managed

nonetheless to bolster local industry by addressing gaps left by MNCs in the international

market (Tigre, 4). With the advent of the micro and mini class of computers,"[for] the

first time, it was possible for small firms to assemble computer equipment by using off-

the-shelf components, and the technical competence needed for that was well within the

reach of the Brazilian electronics industry" (Schwartzman, 71). By 1983 there were

"about fifty-four Brazilian computer manufacturers, of which only eleven existed prior to

1974; twenty-five were created after 1978. These firms started producing 'clones' of

Sinclair, TRS, and Apple computers, mostly with copied software and operational

systems" (71). Many of such 'clones' were already built with the proprietary technology

of the MNC involved and were therefore legitimized and licensed local computers. The

various parts required to construct these indigenous computers also provided a wide local

products market to meet these technological needs. The ability to envision a division of

labor through the outsourcing of parts and the enlarged sense of nationalist control this

provided to ideological guerrillas and frustrated technicians alike set the ground for

globalized vision of Brazilian computer technology innovation that coincides well with

the most recent iteration of open-source software (FLOSS) policy. Or, rather, Brazilian

technical experts and policy-makers have become adept at imagining and positioning

themselves within not only a global market of technology innovation, but a world of

practice in computer innovation that has evolved in its latest iteration as an investment in

free and open software. They do so because they conceptually situate themselves within

what Yuri Takhteyev in *Coding Places* calls "worlds of practice," to signify

"identification with a named global collective… and acceptance of certain meanings and

norms as meanings and norms *of the collective* rather than of specific individual

practitioners" (Takhteyev, 27). In regards to applied software development in Brazil, this

perspective urges us to "look not at the interaction between Brazilian state agencies and

software companies, or at the subjective experiences of the individual programmers, but

rather to put at the center the different 'doings and sayings' that are involved in the

development of software" (32). We should ask not only "how individual software

developers gain access to resources, how they configure and interpret them" but also

about "the social structure of the software practice. This, in turn, opens up the possibility

of a more careful analysis of the ties between software practices in different places" (32).

At this point, FLOSS advocates and insurgent experts—as the latest iteration of the *seres*

técnicos—are not preoccupied with the local production of computer hardware, but rather

at the nationally accessible and sanctioned practice of open-source software as evinced

with the rise of "indigenous" programming languages such as *Lua*.

Brazilian cultural policy at present embodies the rhetoric for this condition of

possibility and applicability by mobilizing discourse of technical expertise as a call for

digital inclusion, articulated with a full understanding of Brazil's prior dictatorship, its

tumultuous economic history, and its particular relationship with technological

innovation. As a result, the kind of policy, rhetoric, and industry that emerges around

software practices evolves from a historically protectionist idea of local, domestic

computer production (Tigre 1983, Schwartzman 1988) to the global-minded idea of

contributing creatively, openly to a public-access body of computer knowledge

prioritized over state and proprietary interests (Amadeu et. al 2013). Brazil has

historically allowed computer policy to become a "national legal code" for not only the

support of local knowledge production on the basis of economic interests but also in

terms of cultural production. As explored prior, open-source taken on a political aspect of

ideological expression of labor, freedom of speech, and knowledge production that reflect

Brazil's current cultural and political climate as well. The far-reaching consequences that

are established through Brazil's various iterations of technology policy through changing

political regimes extend further than the self-referential politics of Brazilian FLOSS

communities. They also enable concurrent technology transfer policies to speak in clear

dialogue with the state's cultural policies, creating a strong association with the right to

use technological platforms, products, and interfaces to build, create and access

knowledge. Subsequently, the Brazilian citizen is able to dovetail historical positions as

end-user and producer into the role of political subject, which has recently come to bear

with the passing of the *Marco Civil*, the Brazilian Internet Bill of Rights.

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