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Reconstructing a Technological History

The technological history of Peru has received very little attention. As a developing nation with little internal capacity for the development of new technologies, it has largely been absent as a primary character in most historical and social analysis, though frequently mentioned in passing in various forms — infrastructure projects, industrial capacity, consumer goods, etc. These various forms of technology, as they tend to do, have faded into the background of our understanding of Peruvian history as something that happened outside the realm of agency of the nation.

But just as various forms of technology have become pervasive in everyday life and have also jumped to the forefront of social analysis as an often overlooked presence affecting and shaping behaviour (Latour, 2008), we would probably be well served by re-evaluating the role technologies have played in the coming together of the modern Peruvian republic. Technologies exert various forms of agency by enabling, disabling, connecting, exposing, facilitating, encouraging, or in multiple other ways providing access to social networks and activities. Failing to account for these gives us an incomplete view of how social phenomena are configured, and how our understanding of the world around us is, too, configured by the tools and technologies at our disposal — and, in turn, these tools and technologies modify our sense of how that world around us can be transformed and reconfigured.

As such, technologies have had an ongoing presence and influence throughout the history of the Peruvian republic — both as objects, and as narrative constructions embodying ideals, desires, and expectations of becoming a modern, independent nation. Understood largely as outside forces, they've been often portrayed within these narratives as drivers of progress and promises of change. And they've just as often failed to materialise those promises into lasting, structural transformations.

In what follows, I will examine how various narratives of progress and modernity have been constructed over Peruvian republican history around specific forms of technology, often developing hand in hand with a period of economic growth fuelled by booming exports of some natural resource. I will describe how these narratives became alternating interpretations of the "technological sublime" — a belief in some form of radical improvement brought about by the introduction of some new technology — and became established as official narratives regarding the country's future and access to a condition of modernity. But I also want to contrast this with the possibility of emerging counter-narratives that offer the possibility of reinterpreting our collective relationship with technology not from the point of view of official narratives, but rather from the practices of creative communities operating almost invisibly, and even obscured and obstructed by these official narratives.

I will begin by examining how the recent export boom in Peru has been couple with a transformative project connected to the deployment of information and communication technologies (ICTs) in various forms, illustrating the process of attempting to articulate a national ideal through technology. I will then provide a more detailed explanation of this concept of the "technological sublime", to then relate it to successive developments taking place over the last 150 years — particularly, the boom in guano exports in the 19th century and the accompanying rush to construct railroad networks across the country, as an especially illustrative case of an official technological narrative — looking for recurring patterns between economic booms and the emergence of discourses and narratives of the technological sublime. I will try to show that these arrangements consistently exhibit a distinct lack of agency from Peruvian society in determining its economic futures, and often result in the

deployment of black box constructions of technology under the promise of access to modernity and, more recently, globalisation. This first section is built primarily on a review of key works by Peruvian historians and social researchers analysing the evolution of the Peruvian nation, as well as the analysis of more recent official documentation from various agencies of the Peruvian government. Moving forward and in contrast, I want to consider in detail a much more recent example of an emerging technological counter-narrative, examining the case of the Peruvian video game industry and how it emerged from an underground culture of hacking and tinkering into a growing industry and community, establishing various alternative infrastructures for learning and play along the way. By examining this case, I want to consider a very different form of relating to emerging technologies occurring within the same geographical space, but treating technologies not as black boxes but rather as flows of knowledge and social relations that can be grasped, analysed, and tinkered with. This section is informed by an analysis of the documentation trail left behind by a video game hacking and development group active between the late 1980s and early 2000s, as well as interviews with current members of the video game industry in Lima, Peru, during a field research trip between May and August 2013. Finally, I will conclude by pointing out some ways in which these contrasting interpretations of the relationship with technology have present-day consequences and implications for technology industries and public policy.

2.1   Peru 2.0

If you were living in Peru towards the end of the 1980s, it would've been perfectly understandable for you to have thought the world was about to end.

Peru transitioned back to democracy in 1980, after twelve years of military rule, in an environment that was quickly becoming terrifying. During the 1980s and early 1990s, the country experienced its most devastating internal conflict in the fight between terrorist movements, primarily the Shining Path radical communist group, and the Peruvian government and armed forces. The conflict spanned over a decade across

large areas of the country, resulting in the death or disappearance of about 70,000 people. The causes and development of the conflict have been studied in detail (Comisión de la Verdad y Reconciliación, Perú, 2003) and are a matter of continuing discussion and political debate, but the Peruvian Truth and Reconciliation Commission, tasked with investigating the causes, development and consequences of political violence between 1978 and 2000, concluded unambiguously that the structural divides cutting across the nation socially, culturally and economically had been the breeding ground for the growth and spread of terrorist discourse. The failure to articulate a nation throughout geographies and social classes had ultimately led to thousands of people failing to acknowledge the legitimacy of the legal and political order under which they were living. The recurring failure of both government and society to capitalise on the unexpected and unintentional opportunities for development that had materialised over the course of the republic's history had ultimately exploded into a situation of extreme violence.[1]

As the country was being torn apart by the fighting between the terrorist groups and the armed forces, hundreds of thousands of people fled from the countryside seeking refuge in the cities along the country's coastline. But the cities weren't doing much better: the country's economy had collapsed during the last military regime, and hyperinflation was ravaging the entire continent all through the 1980s. A series of financial and monetary blunders by then-president Alan García would

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[1]From the Conclusions to the Truth and Reconciliation Commission's Final Report:

"The TRC has confirmed that a clear relationship existed between the condition of poverty and social exclusion, and the probability of being a victim of violence. The Andean region of Ayacucho concentrated over 40 percent of the dead and missing reported to the TRC. When added to the victims registered by the TRC in the regions of Junín, Huánuco, Huancavelica, Apurímac and San Martín, they add up to 85 percent of the victims registered by the TRC. (...)
The TRC has observed that, along with socio-economic gaps, the process of violence made explicit the severity of ethnic and cultural inequalities still present in the country. From the analysis of testimonies received, 75 percent of fatal victims in the internal armed conflict were primarily speakers of Quechua or other native languages. This contrasts starkly with the fact that the population sharing this characteristic represents only 16 percent of the Peruvian population according to the 1993 census. (...)
The TRC has found the conflict exposed limitations to the State's capacity to guarantee public order and safety, as well as fundamental rights of its citizens within a democratic frame of action.
The TRC, as well, has found a precarious validity of the constitutional order and rule of law, which were vulnerated in those times of crisis." (Comisión de la Verdad y Reconciliación, Perú, 2003, vol. VIII, pp. 315-316, translation mine)

result in the country's economy going into free-fall towards the later part of the decade, with a failed attempt to nationalise the entire banking system, a default on most international obligations, crippled industrial and agricultural infrastructures and, most notably, a cumulative inflation rate of about 2,000,000% by the end of his five year term in 1990.

The country experienced drastic, but also traumatic transformation in the 1990s. The administration of Alberto Fujimori, after unexpectedly being elected into office, pushed forward an agenda of radical neoliberal reforms that were able, over time, to jolt the economy back into shape. Counter-terrorism initiatives put in place in the late 1980s also reaped large gains with the capture of the leader of Shining Path, forcing the highly centralised organisation of the terrorist group into major disarray and retreat. But these largely accidental victories for the Fujimori regime were capitalised politically, giving him enough political capital to shut down Congress in 1992 and enact a new Constitution favourable to him (Contreras & Cueto, 2004, pp. 304-404). This gave him free reign to articulate the largest and most complex corruption apparatus ever seen in Peruvian history, ultimately remaining in power under a questionable legitimacy until the year 2000, when he was forced out of office by major corruption scandals involving his top aides and himself.[2]

Since the late 1990s and through the 2000s, Peru has been reaping the benefits of a natural resource boom fuelled by the high prices its mineral exports have been commanding in the international market. The country has been an important mining enclave ever since colonial times, if not even before. Nowadays, rising mineral prices have motivated massive investments in large mining projects, more often than not financed and implemented by foreign corporations capable of bringing together the human and financial resources required for these large endeavours. Riding on the back of these massive investments and the infrastructure projects required for their

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[2]Fujimori's resignation from the Presidency while at an international summit in Brunei was rejected by the Peruvian Congress, which opted instead to censure him on moral grounds. He fled to Japan were he was immune to extradition on account of being a Japanese national. He travelled to Chile in 2005 where he was arrested by local police at the request of the Peruvian embassy, and after lengthy judicial proceedings was extradited to Peru in 2007. He was tried, found guilty and sentenced for crimes against humanity including abuses by State and paramilitary forces under his command, for which he is presently serving a 25-year prison sentence.

operation, the country has seen several years of continuous economic growth and the betterment of many economic and social indicators even through a devastating global financial crisis. But even still, mining activities come at a huge social and environmental cost. Natural landscapes are dramatically transformed, resources are many times inevitably contaminated, and local economies are radically distorted by the sudden influx of people and money to areas that are often remote and secluded. As of June 2013, the national Ombudsman's Office reported 223 instances of social conflict nationwide, of which 145 were caused by socio-environmental issues (Defensoría del Pueblo, 2013). While these are not necessarily violent conflicts, it paints a clear picture of ongoing social and cultural tensions which are reminiscent of the social climate that has already erupted in significant systematic patterns of violence in the past.

The boom in mining exports does bring about a renewed opportunity for the country, and the government in particular, to close the massive infrastructure gap that contributes to keeping the country divided and large portions of its territory entirely disconnected. Among the measures taken to modernise the country and to capitalise on the export boom to bring about a new nation, better connected and articulated, there is the promise of the radical transformation that will come about though the implementation of new technologies — in particular, information and communication technologies (ICTs) promising direct line of connection with the globalised world.

Starting in 2001, the administration of Alejandro Toledo launched the ambitious "Plan Huascarán", which sought to provide computers and Internet access to all public schools in the country (Ministerio de Educación, 2001). Toledo campaigned heavily on the project during the elections, and once in office, it widely promoted next to big-name partners such as Telefónica, the Spanish telecommunications giant, and Bill Gates, then-CEO of Microsoft (Caretas, 2001). The project's colossal ambitions were ultimately met with disappointment — the program aimed primarily at introducing computers in schools, but deployment was poorly planned, often lacking basic infrastructure to make use of the computers (even, in some cases, electrical connections) or proper teacher training. Allocation of resources to schools was done arbitrarily,

leading to computers being assigned on a political basis, and ultimately, the obscure and confusing procurement process — in itself poorly designed — became entangled in accusations of corruption (La República, 2006).

Just a few years later, the second administration of Alan García[3] pushed forward a massive deployment of XO-1 laptops from the One Laptop Per Child project. The Peruvian government distributed a reported total of 797,352 laptops (Ministerio de Educación, 2013) with the objective of providing one to every child in a public primary or secondary school — the largest deployment of XO-1s by any single government in the entire world. The XO-1s were technically a much better fit for the Peruvian context — relying on batteries that could be hand-cranked, and capable of creating *ad hoc* mesh networks to share available Internet connections with other units wirelessly. Yet the project ended up displaying many similar faults: little attention was paid to teacher training, and consequently, the units received very little use time in class. School administrators were more concerned about the possible personal consequences of having machines break down or disappear, choosing instead to lock the units within single-use computer rooms where kids got limited access to computer time. These emergent issues, coupled with similar accusations of mismanagement and unresolved issues with the procurement process, have made the project widely considered to be a large-scale failure despite its staunch defence by then-government officials in charge of its design and implementation, and an ongoing maintenance problem for later administrations. A representative from the Ministry of Education under the subsequent administration explained to me not only how hard it had become to source content for the XO-1s given the limited size and energy behind the Sugar operating system developer community (prompting them to have to switch to better supported by less optimised versions of Linux), but also how they were already dreading an impending problem once it became necessary to replace the existing machines. In short, as a local researcher of the deployment process told me during a conversation, it is a "journalistic exposé waiting to happen."

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[3]After spending several years in exile following political persecution from the Fujimori regime, García returned to Peru and, despite the catastrophic results from his first term, managed to win the 2006 presidential elections.

The latest iteration of this trend is now focused on fostering technology entrepreneurship such as that found in places such as Silicon Valley, as hundreds of people in Lima and across other cities begin to contemplate the prospect of being the ones to come up with the "Peruvian Facebook" — a prospect that is fuelled by the media (El Comercio, 2011) and, to some extent, by government agencies hoping start-ups might be the ones to take over the technological transformation of Peru. Young people in Peru are presented idealised narratives of entrepreneurship and success, such as those of Mark Zuckerberg in the film *The Social Network*, or Steve Jobs in *Jobs*, along with quotes, mantras, and tips circulated through publications, social networks, and a growing number of events aimed at young entrepreneurs hoping to make it big with a new website or a mobile app. To support this emerging trend, the Peruvian government launched the Startup Peru initiative in late 2013 (Stewart, 2013), modelled on similar initiatives implemented in Chile and Brazil. Startup Peru provides seed funding for early stage ventures in technology industries, along with mentoring resources to develop and validate a business plan capable of attracting outside investment. It is also an exceptional collaboration between the Ministries of Production and Finance, as well as CONCYTEC (the National Science and Technology Council) and FINCYT (the Science and Technology Innovation Fund). Startup Peru is a clear reflection of the way discourses of innovation and entrepreneurship around technology have attracted much more attention in previous years than more infrastructure-focused concerns, largely because of the massive financial returns of technology industries based in Silicon Valley and technology and financial media trumpeting their combination of high-risk entrepreneurship with free market disruption as a highly successful one to follow.

There is, however, a pattern in all these iterations worth analysing more closely. These three interpretations of articulating ICT infrastructures with the resources from an export boom are similar in that they all deal with technologies as linear black boxes — devices that can be easily dropped into a social context and reconfigure its inputs into more modern, globalised, networked outputs. Whether it is deploying computers in schools, delivering laptops to kids in rural areas, or having young people building

apps, these are all operating as largely linear processes under the assumption deployment of these technologies and processes will lead to roughly uniform results. And the desired results are all aligned with pushing a technologically-challenged country, used to banking on its vast stock of natural resources for its survival, onto the track of modernity: if only we can get these technologies in place, these projects assume, then we will become a modern nation and overcome the geographical, cultural, and social challenges that have stopped us from being one.

The boom in mining exports is not so much buying computers and paying for Internet access, but rather it is underwriting a promise of nation-building. That promise, in turn, becomes instantiated in black boxes attributed with almost magical powers: it becomes a promise, ultimately, of a technological sublime.

2.2   Pursuing the Technological Sublime

In the 18th century, Immanuel Kant set about in his critical project to determine the bounds of reason and of what could legitimately be claimed as "knowledge" in the sciences, morals, and, as explored in his third critique, the *Critique of Judgement*, aesthetics and taste. Within his description of the operations of aesthetic judgement, Kant associated aesthetic experience with the categories of the beautiful and the sublime (Kant, 2007). He described the experience of the beautiful as something different from intellectual understanding — whose main purpose was to subsume judgements under broader, more universal concepts and categories — but still related to one's intellectual faculties. Namely, the beautiful was that which produced in the subject an alignment or a certain harmony, and requiring no words to be explained. The experience of the beautiful can perhaps be better illustrated through Walter Benjamin's later concept of the *aura* (Benjamin, 2008), the experience of contemplating a work of art in its "there-and-then", an experience impossible to reproduce outside of its original context.

In contrast, the experience of the sublime was that in which an object entirely overwhelmed a subject's capacities and faculties and resisted any intellectual or moral

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categorisation. The sublime was best illustrated by Kant through the contemplation of the vastness of nature, like an endless ocean, or a huge mountain, or other natural phenomena which, rather than requiring no words to be explained, cannot be explained through words. The sublime refuses to be domesticated by language; as soon as its overwhelmingness can be communicated, it ceases to be sublime to become ordinary.

The idea of a *technological* sublime was introduced by Leo Marx to describe such overwhelming capacities being attributed to technological objects (Marx, 2000). But the technological sublime does not refer to technological objects being sublime in and of themselves, as per through some metaphysical capacity. Marx spoke of a "rhetoric of the technological sublime" that was deployed in specific patterns and practices as a social construction surrounding specific technologies, an idea later appropriated by James Carey when describing the impact of such technologies as the telegraph and the railroad in establishing an idea of a modern nation in 19th century America (Carey, 2008b) — a more specific experience of the sublime which he terms the "electric sublime". Carey's electric sublime is similarly a rhetorical construction in which ideals, desires and expectations were projected onto a technological object — building the notion that the introduction of a technology could, by virtue of its own affordances, bring about qualitative and significant social change:

> The relationship between communication and transportation that organicism suggested — the nerves and arteries of society — had been realized in the parallel growth of the telegraph and railroad: a thoroughly encephalated social nervous system with the control mechanism of communication divorced from the physical movement of people and things. (...) This belief in communication as the cohesive force in society was, of course, part of the progressive creed. Communications technology was the key to improving the quality of politics and culture, the means for turning the United States into a continental village, a pulsating Greek democracy of discourse on a 3,000-mile scale. This was more than a bit of harmless romanticism; it was part of an unbroken tradition of thought on commu-

nications technology that continues to this day and that Leo Marx (1964) named and I appropriated as the "rhetoric of the technological sublime." (Carey, 2008a, p. 110)

The rhetoric of the technological sublime is deployed at multiple levels: it is not only the implementation of technologies, but the surrounding descriptions and narratives that are built around them. Official discourse, advertising, press coverage, public policy, literary and artistic depictions, social anxieties, moral panics, spiritual and religious beliefs, educational systems, and institutional arrangements all come into play. Technologies on their own don't come packaged with specific idealised constructions of possible future societies; but rather, when elevated to the position of the sublime, a whole universe of discourse comes together describing a new state of affairs. Throughout Peruvian history, this has come together quite clearly during periods of rapid economic growth that has offered the unusual opportunity of modernising the nation at an accelerated pace. Technologies deployed during these times came to symbolise not only practical improvements to social affairs (i.e., the possibility of faster, safer travel across the country), but also the overcoming of the many historical obstacles the country had faced in truly coming together as a nation: geography, ideology, race, poverty, all became issues that could be leapfrogged over through the deployment of technologies such as those available in industrialised nations.

The power of this rhetoric lies in its capacity to mobilise multiple layers of society at the service of fulfilling its promise for transformative social change — often, as we'll see below, regardless of the actual probability of such promise being fulfilled. In Peruvian technological history, the technological sublime became the recurring establishment of a vertical, top-down relationship with technology, where it was perceived as an outside, opaque force capable of realising that which social actors were incapable of. As such, the technologies that were to transform the nation were just as external as the sources of prosperity that made their deployment possible, perpetuating both political and technical asymmetries within Peruvian society and with the outside world.

To fully articulate that, we can observe more closely the cycles of economic pros-

perity throughout Peruvian history and their associated rhetorics of the technological sublime — in particular, the guano boom of the mid-19th century that led to the first big push for modernisation in the form of the national railroad network.

2.3   The Promise of a Nation

For a lengthy period of time during the nineteenth century, Peru's economy lived primarily off the exports of guano — a fertiliser discovered to lie in abundance across a series of isles just off the coast. Its high nitrate concentration led to it being adopted across industrial Europe to boost the yield of farmlands, which in turn led to skyrocketing demand and a sudden influx of capital the still-new government was unable to channel properly. For the first time since its republican inception, Peru had some money in the coffers to actually try and build a nation after decades of infighting between regional *caudillos* had dilapidated any resources and failed to establish any solid institutional basis (Orrego, 2005). The sudden influx in capital became the platform on which to build a renewed idea of a modern nation which would finally be able to make the leap forward into industry, and the image of the technological sublime then became associated with promises of huge infrastructure projects like the national railroad system.

The history of the guano economy in Peru is interesting both because of its long-lasting effects on Peruvian society, but also because as a process, it came to crystallise what would come to be a recurring cycle in Peruvian economic history.

The benefits of guano were discovered by foreign researchers who shipped some samples to Europe for analysis of its potential as fertiliser. The guano economy was not locally initiated, nor was the technical and scientific infrastructure in place for local researchers to notice or develop this potential. When the unexpected demand for bird poo started to come in, the Peruvian government scrambled to put together an export operation, especially as local entrepreneurs found themselves incapable (and largely unwilling) to handle the know-how and capital requirements of the process. Once the country was rid of the colonial bureaucratic apparatus managing all things,
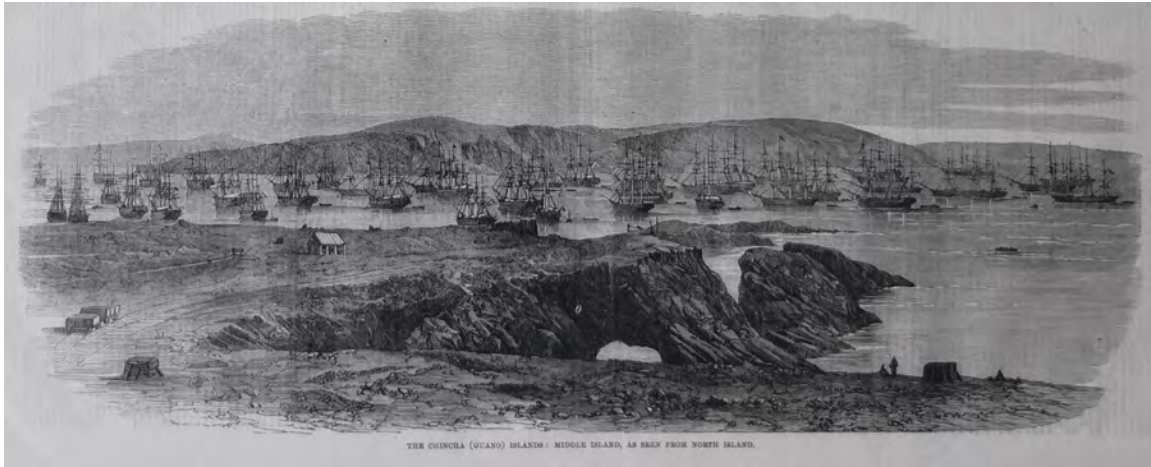
Figure 2-1: A photograph of ship traffic around the guano islands of Chincha. Manuel González Olaechea y Franco for The Illustrated London News, 1863.

including (perhaps especially, given the interests of colonial rule) international trade, the new republic found itself deprived of processes, people, institutions and capital to manage large-scale export operations. When guano was found to have enormous demand, building the layers of infrastructure to successfully get it out of the isles, loaded on to a ship, and ferried all the way to the European markets that wanted it, required local entrepreneurs and the national government to relie entirely on international sources of human and financial resources. Rather than building profitable enterprises around guano exports, the government opted instead for a model in which foreign entrepreneurs would make the required investments and reap all the profits from sales of guano in international markets, in exchange for paying very high fixed amounts of money to the government. In this way, the government assessed it would be sheltering itself from any sort of risk associated with the trade of guano (Contreras & Cueto, 2004).

The availability of a fixed source of income, however, offered a sense of stability previously unseen ever since independence was attained. This sense of stability allowed the government to actually think of itself as a Nation-State for the first time, and to consider how to bring together a country that was fragmented across historical, economical, geographical, and cultural dimensions. The country was able to produce its first national budget in its history in 1848, and during the administration

of Ramón Castilla, an aggressive plan to reach out into the Andean highlands and into the Amazon jungle was drafted, built atop a technological promise: the industrial prospects offered by the introduction of the railroad. For a bourgeoisie that was just beginning to come together — and that had been surprisingly absent from the independence process (Bonilla & Spalding, 1972) — it was an acceptable formulation that the nation had failed to coalesce over time because of clearly understood infrastructural shortcomings, rather than complicated and self-implicating social and historical explanations:

> [T]he diagnosis from a sector of the proprietor class centred on the problem being the lack of communication of potential productive areas with Europe. The solution, therefore, would be the pursuit of loans to be dedicated to the construction of railroads to articulate mines and farms with ports. Reducing the cost of shipping should have a considerable impact in reducing cost of production of raw materials, making them competitive in the international market. At the same time, this situation would motivate proprietors to invest in those sectors, establishing a new economic circuit that would ensure, definitively, social peace. (Cotler, 2005, p. 114, translation mine)

While the Inka Empire had connected vast extensions of land across the continent through networks of roads and running messengers, the Spanish colonists had paid attention only to those roads and connections bringing together important economic hubs, such as Cusco or Potosí. By the mid-ninteenth century, most cargo and people transport from the highlands was done on the back of mules or llamas, at huge expense and risk. The railroad carried a promise of national unity and economic development, by connecting the remote towns and villages in the Andes to the ports and cities along the coast. But it was also the driver of an important aspirational idea: to become articulated as a nation through the railroad was to become a modern nation, one that rode around on the same technologies as the European powers of the time — forging a promise of modernity and development that resembles what anthropologist Brian

Larkin describes as "the necessary spectacle of colonial rule" (Larkin, 2008, p. 36). It would have just as much direct impact on everyday life as it had symbolic power in bringing the country closer to the developed world.[4]

Across several administrations, the Peruvian government made huge investments into building railroads, most of them poorly calculated, and all of them awarded to foreign engineers. The railroad lines were plotted not so much in terms of convenience or economic benefit, but more in terms of political affiliations and calculations. The peculiar nature of legislation at the time, which established different legal regimes and protections for indigenous peoples, established a paradoxical situation where the government had to bring in large amounts of unskilled labour into the country to work on the railroads, who were brought mostly from south-east Asia to become locked into extremely poor and abusive working conditions. Just as with the trade of guano, local entrepreneurs lacked the human and financial resources for large-scale infrastructure developments, forcing the government to contract out the building of railroads to international investors, and financing the operation through international credit with the income from guano as collateral. As the railroad projects grew larger and more complicated, and therefore more expensive, the government kept signing off on new loans as the guano reserves grew smaller because of overexploitation, and as demand began shrinking in Europe because of new technical developments. Over time, the payments on the loans eventually became larger than the income the government received from guano, while the railroads remained unfinished and were providing virtually no contribution to the national budget other than their operating costs.

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[4]Larkin, referring to the deployment of infrastructure as part of the construction of what he terms the "colonial sublime", describes it as follows: "One intent in using infrastructural technologies in colonial rule was to provoke feelings of the sublime not through the grandeur of nature but through the work of humankind. Th erection of factories; the construction of bridges, railways, and lighting systems; indeed the terrifying ability to remake landscapes and force the natural world to conform to these technological projects by leveling mountains, flooding villages, and remaking cities; these were the ways in which the sublmie was produced as a necessary spectacle of colonial rule. (...) But the colonial sublime carries within it two distinct models of colonial rule. One is based on difference and the sharp separation between colonizer and colonized when technology is used to incite awe. The other proffers technology as a mode of development. It proffers access, through education and training, that domesticates the sublime and thus destroys it. This mode collapses otherness through the lure of technology as a way of becoming modern." (Larkin, 2008, p. 36-37)

The implications were far-reaching. The railroads were never completed, and whatever portions were finished were handed off in concession to foreign corporations with which the government had contracted enormous amounts of debt.[5] The income from guano trade slowly diminished over time, as the foriegn corporations who managed it found little value in improving the product or the process and found it more profitable to switch to alternative fertilisers. The Peruvian government and local entrepreneurs were unwilling or incapable of doing so either. Towards the 1870s, saltpeter (or potassium nitrate), found in abundance in the south of Peru and the coast of Bolivia (later to become the north of Chile), began to replace guano as the more popular fertiliser. International competition over leadership of the saltpeter trade would later become one of the factors leading to the War of the Pacific between Bolivia, Chile and Peru, resulting in the Chilean annexation of the Antofagasta region of Bolivia and the Arica region of Peru, where the main saltpeter deposits were located, and in the crippling of the Peruvian economic, military and political establishment for many decades to come. Jorge Basadre, the foremost Peruvian historian, described the outcome in the following way within his massive *History of the Republic of Peru*:

> Peru suffered multiple shocks as a nation during the 19th century. None
> such as the war of 1879. It was the roughest shock Peruvian men experi-
> enced during that century. It ignited the entire territory, south to north,
> from the coastline to the highlands. It implied enormous fiscal loss, pen-
> etrated the economic and industrial domain of cities, the villages and the
> fields, the homes and even the indigenous communities. There was no one
> at the time, young or old, man or woman, who was not affected by this
> drama in one way or another. Once the State's scaffolding was wrecked
> after the two battles outside Lima, simultaneous and opposing regimes

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[5]Julio Cotler, renowned Peruvian social researcher, adds this when describing the failure of the the railroad projects: "The natives were forced to work on such projects to the benefit of provincial oligarchies. On the other hand, internal demand was being satisfied primarily through imported goods due to lower costs and the abundance of currency. Finally, the railroads failed as a means to reduce the cost and promote production and shipping of commodities. After a couple years of having been awarded the Arequipa-Puno railroad concession, [American contractor Henry] Meiggs was giving it back to the Peruvian government, claiming mule transport represented an unbeatable competition." (Cotler, 2005, pp. 117-118, translation mine)

emerged, all of them illusory, attempting to rebuild it. Beneath them, and more importantly, the national identity expressed an unbreakable will to carry on existing, to endure.

After the nightmares of war and occupation ended, the nation was still alive. But it was a weak, amputated, hurt country. In summary, an ailing country. (Basadre, 2000, vol. 8, p. 1977, translation mine)

The guano economy became a symbolic episode for many reasons that have merited an enormous amount of analysis, and continue to do so to this day. But despite its well-known significance, the same basic patterns have repeated themselves over time on many occasions. About four decades after the guano boom, during the 1920s the nation experienced a similar, though smaller boom around the extraction of natural rubber, discovered in abundance in regions of the Amazon jungle. The pattern was similar: the potential was identified and developed by foreign investors, and the technical, institutional, and social layers of infrastructure proved incapable of capitalising on the sudden influx of resources due to increased exports. And so was the corresponding image of the technological sublime: where previously it was railroads that would unite the nation, this time it was highways and cars that represented the technological pathway to becoming a modern nation. In less dramatic fashion than with guano (but with dire consequences to the population in the regions were extraction took place), the outcomes would be ultimately just as disappointing: once the natural rubber boom was come and gone, no significant infrastructure changes materialised. The jungle regions of Peru continued to be left behind as the rest of the country struggled to consolidate as a functional nation.[6]

The 20th century saw an additional natural resource boom in the 1970s around

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[6]Historians Carlos Contreras and Marcos Cueto describe the terrible exploitative conditions under which rubber trade took place: "Although it is difficult to quantify exports because of the large amount of contraband, apparently towards 1910 rubber came to represent 30 percent of total Peruvian exports. It then vanished almost entirely, when British interests found sources of rubber in colonial plantations in India and Ceylon to be more profitable and safe. The rubber system was one of savage, primitive, and wild exploitation, which depredated resources and dispossesed hooked natives and highlanders it brought to work in the Amazon. Workers were subjected to a system of virtual slavery, and were limited to gathering rubber from the trees in conditions of total isolation." (Contreras & Cueto, 2004, p. 216, translation mine)
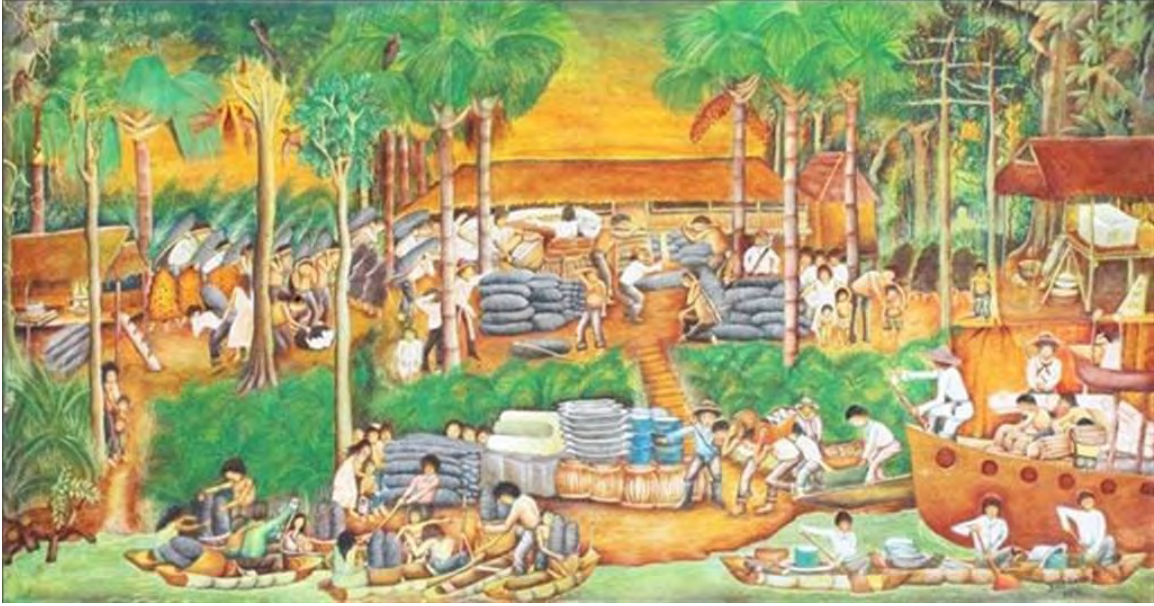
Figure 2-2: Brus Rubio. *La explotación del caucho en Pucaurquillo* (*The Exploitation of Rubber in Pucaurquillo*). Natural tincture on tree bark.

the exploitation of Peru's fishing resources and the production of fishmeal, leading to the nation becoming the first worldwide exporter of this resource for a while. The fishmeal boom had its corresponding image of the technological sublime in the implementation of industrialisation through import substitution. The nationalist Revolutionary Government of the Armed Forces, which took power by force in 1968 and maintained military control of all aspects of government and production until 1980, established fierce import controls intended to stimulate the development of locally-produced substitutes, following a model that had been successful in achieving rapid industrialisation decades earlier, among others, in countries such as Brazil and Argentina (Murmis & Portantiero, 2004). Overproduction of fishmeal led to depredation of the natural resource, while artificial price and trade controls became unsustainable over time, forcing the military government to relinquish power back to civilian authorities amongst growing population unrest.

All throughout, ever since the guano boom we can identify a series of recurring elements that have been present in these boom-and-bust cycles — including the present boom around mineral exports. Economic booms throughout Peruvian history have all (1) been connected to the exploitation of some natural commodity which has un-

expectedly (and because of foreign interest) seen high international demand; (2) faced infrastructure, knowledge and financial inadequacies that have required the intervention of foreign investors for the potential to be developed; (3) been closely connected to the actions of government, which has typically sought to establish a mechanism to derive some form of fixed income from the economic activity, rather than assuming any form of risk; (4) consistently failed to materialise into long-term impact, develop the capacities of local populations, or spill over into the emergence of other productive activities; (5) been closely associated with some narrative construction of the technological sublime, promising radical qualitative change into a modern, industrialised nation through the deployment of fashionable technologies.

In short, these cycles display three important characteristics: a distinct lack of agency regarding the economic development of the nation, a reluctance or incapacity to assume the burden of risk associated with driving change and growth, and a fixation with anchoring the national identity in relation to an ideal of progress and modernity.

I've chosen to provide a lengthy, though still superficial account of key aspects of Peruvian economic and social history because I believe there are structural elements to be found that are relevant to our more specific present discussion around the emergence of new technology industries in the Peruvian context. Since these elements are unfamiliar to most people (even in Peru itself), I think it is especially relevant to look back and consider everything that has been and still is at play in the negotiation of Peru's self-understanding as a modern nation or otherwise. This self-understanding cuts across multiple categories of analysis: it permeates into issues not only of technology, but also of institutions, discourses, and everyday practices.

Significantly, the various forms adopted by the discourse of the technological sublime are always an officially-sanctioned narrative, articulated as to mobilise social actors and political interests at the service of the country's modernisation. But just as there have been official narratives governing Peruvian technological history, there have been less discussed, often invisible counter-narratives of technology deployment taking place not only without official sanction, but even facing significant opposition for social and cultural reasons. The history of the video game industry is one

such counter-narrative that may hold an alternative way of interpreting how Peruvian society relates to technology.

2.4 Gaming as a Technological Counter-Narrative

Perhaps what's most interesting about the emergence of the gaming industry in Peru is how it is arguably not supposed to be there at all.

To be certain, video games are not a component of this latest incarnation of the technological sublime constructed around digital technologies. Video game development in Peru has had its own independent history almost entirely in the shadows, operating not as a top-down deployment of technologies as tools and processes, but rather as a bottom-up, chaotic and iterative assemblage of various moving pieces. The history of video game development in Peru is illustrative not so much of a clean jump into the creative production of modernity, as it is a messy cycle of trials and errors through which hobbyists and makers have stumbled their way to the foundations of an industry. Because of this, I believe games provide a very interesting counter-narrative to the deployments of the constructions of the technological sublime that we've seen above happening throughout Peruvian history, and therefore, an alternative understanding as to how peripheral communities in developing economies establish relationships with technology on their own terms, in ways that may become interesting and meaningful for their larger contexts to engage in — and perhaps healthier and more sustainable for social actors to engage in.

Video game development in Peru can be traced back to the 1980s, when the first experiments in this area began to take place. The oldest game developed in Peru that I've been able to trace was *Aventuras D'Onofrio*, an advertising game developed for the Atari VCS (a.k.a. the Atari 2600) by a group called SISTAP in 1987 (and later ported as well to the Apple II). *Aventuras D'Onofrio* is interesting for several reasons: firstly, because it might very well be the first *advergame* developed in the Latin American market (though this claim remains to be verified or, alternatively, challenged). Secondly, because of its distribution method: the game was developed

Figure 2-3: A screenshot from *Aventuras D'Onofrio*. Game developed by SISTAP for D'Onofrio (now part of Nestlé Perú).

for D'Onofrio, a popular local brand of ice cream, and players were able to acquire a copy of the game by trading in a number of ice cream wrappers as part of a promotion. Thirdly, because of the technical achievement: as I've heard in interviews with people who were part of the scene at the time, there was a very limited number of people who were doing any form of programming at all, and even fewer resources for people to learn about coding. In addition, the Atari VCS was a notably difficult platform to develop for because of its technical limitations, forcing programmers to come up with ingenious hacks and workarounds to get the system to perform as expected (Montfort & Bogost, 2009). Given the combination of both these factors, that an Atari VCS game was developed at all in this context is remarkable; that it was developed for an established brand in an unproven medium, doubly so.

While *Aventuras D'Onofrio* is interesting, by far the most important reference in early Peruvian game development is the Twin Eagles Group (TEG), a coding and hacking group founded and managed by a controversial figure known mostly as Mr. Byte. The history of TEG is captured in various levels of detail in the group's website —- a frozen online archive apparently last updated in 2006 (Twin Eagles

Group, 2006).[7]

Their story unfolds across an especially remarkable timeline —- one that could be rightfully labelled as "a series of unfortunate events". The group was active between 1989 and 2003, when it ultimately dissolved (after going through several iterations and reconfigurations in between). This situates its inception just at the tail end of one of the toughest periods in recent Peruvian history: the later years of the first presidency of Alan García and the catastrophic consequences described above. Severe import restrictions generated by an aggressive import substitution policy, and a monetary policy generating yearly inflation rates of up to 8,000% and restricted access to foreign currency, made access to any form of technology or electronics incredibly limited. Informal distribution circuits for consumer electronics smuggled into the country became common in the bigger cities such as Lima, and as far as games were concerned, they became the primary distribution channel throughout the 1990s.

In this environment, TEG was born as a Commodore 64 (C64) coding group, heavily focused on making software available to the C64 community existing at the time in the city of Lima. Their self-documented history portrays them as a "Robin Hood" figure of the C64 informal software distribution scene: many other groups active at the time were in the business of importing and selling C64 pirated software at a profit, going through the process of cracking the software themselves to defeat various early forms of copy protection. These groups would sometimes go as far as to appropriate software from other cracking groups and replace their credit and attribution information with their own, something with which TEG took huge issue on the grounds of respecting the intellectual moral rights of authors over their "creations" — because of the skill required by the programmer to crack the software, TEG and others considered this accomplishments to be creative in itself. By contrast, TEG made no profit on the software they made available (although they would sometimes charge

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[7]Perhaps as a testament to its 90s heritage, the website runs on outdated Active Server Pages, a relatively popular mechanism for dynamically generated content at the time, delivered by what seems to be an aging Microsoft IIS web server which can often be found offline. When fully printed out (as I had to do on account of the frequent blackouts in availability), the archive spans 236 pages containing articles, game descriptions, member lists, event records, photographs, amongst other various things. The online archive also contains assorted related files such as disk images and playable files for some of their game projects.

depending on the amount of effort invested, or the cost of acquiring the original software) and encouraged its distribution through then-nascent telephone Bulletin Board Systems (BBS) where the files were available for download, or through self-organised "copy parties" where people could bring their own 5 1/4" floppy disks and get their own copies of software. In some instances, TEG would even take the commercially-available cracks and crack them again openly to then distribute them through these alternative channels. When I spoke to Mr. Byte in Lima, he described to me how TEG's distribution network reached dozens of operators across the entire city, giving them the capacity to spread software across the entire community in a matter of days, and doubling as an intelligence-gathering network providing information on their competitors.

The BBS they operated and the copy parties were the early forms of alternative infrastructures TEG set up to enable community building and information circulation. At the time, the Compañía Peruana de Teléfonos (Peruvian Telephone Company, CPT) was publicly owned and operated, making telephone calling rates very cheap. While quality of service was inconsistent and connectivity speeds for data connections very low, it made it affordable and feasible for users to connect to a BBS and download files, even if it meant remaining connected for several hours.[8] At the same time, an outdated legislative framework regarding intellectual property encouraged a fairly lenient attitude towards transgressions and violations of copyright, which became the umbrella under which informal markets around counterfeit and pirated goods grew and events such as the copy parties could take place with relatively little concern. Copy parties, in turn, were about more than just the circulation of software: because of the high regard TEG had for cracked software as a form of authorship, copy parties were partly about celebrating these authors and providing them with a venue where they could present their work. Through this exposure, TEG was also contributing towards building a sense of community among crackers and modders in the C64 scene in Lima — something that was, to an extent, intentional: Mr. Byte, the group's

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[8]Bulletin Board Systems operated through direct telephone connections: users would use a modem to dial directly into another terminal (a host) waiting for connections. Some hosts were capable of sustaining multiple concurrent connections.

founder, had been exposed to the *demo scene* of hackers and crackers while living in Europe at a young age, and upon his arrival in Peru he was very interested in replicating that sort of community feel in Peru. This connection made the early game development scene in Lima resemble in several ways the ethos, practices, and attitudes of the European *demo scene*.

In the 1990s, the neoliberal reforms of the Fujimori regime would affect the group's operations in various ways. Fujimori's victory was a surprise to everyone in 1990 — even himself — and he quickly found himself in need of a team to take control of the Peruvian government. His economic team came to be composed of neoliberal economists and businesspeople who quickly pushed for a market-based agenda of deregulation and privatisation, following the recommendations of the so-called "Washington Consensus" pushed for by the United Nations Economic Commission for Latin America and the Caribbean. The package of reforms implemented in Peru — collectively known as the "economic shock" — included privatising several inefficient and costly private utilities, including the CPT, which was auctioned off to the Spanish telecommunications giant Telefónica. After privatisation, calling rates rose dramatically and essentially crippled the BBS community, while Internet adoption was still slow and costly. As the country was trying to re-embed itself in the international financial and commercial community, it was especially susceptible to international pressure on trade issues. This led to a sustained effort from the government to strengthen property rights, leading in turn to a full overhaul of the nation's intellectual property legislation in 1996, which was updated to contemplate newer media (such as software) and to facilitate enforcement by law agencies. A new government agency for the protection of intellectual property was created (INDECOPI, the Institute for Consumer and Intellectual Property Protection), and pressure to crack down on piracy, contraband and counterfeit goods was significantly incremented in line with the interests of new trade groups such as the Business Software Association (which represents the interests of software firms such as Microsoft and Adobe, among others).

The rapidly changing context made it increasingly difficult for TEG to operate as

a hacking and coding group, as originally conceived. The group was active through the entirety of the Fujimori regime and the democratic transition between the years 2000 and 2001, when they attempted to regain some traction after long periods of inactivity and instability by releasing a series of games fitting the political theme of those years: *The King of Peru*, a fighting game starring local politicians participating in the elections as playable characters, garnered them enough media attention that they developed and released a sequel the following year. *The King of Peru 2* was the first locally developed game to be published and distributed for the domestic market, at the time being sold in physical CD-ROM format at retail establishments. However, it ended with them getting into a complicated legal dispute with their distributor over royalties generated by the game (which is, of course, extremely ironic considering the group's origins). The financial pressures stemming from the legal dispute took a big toll on the group, which quickly had to scramble alternative forms of funding: the group released *Samba de Oruga*, a pornographic knock-off of Tetris, under a model they termed "polladaware" (following the Peruvian popular tradition of "polladas", neighbourhood parties thrown by hosts to raise funds towards some particular cause) — an independent release for fundraising purposes. Unable to raise any further resources to continue their battle in the courts, the group ultimately folded for the last time in 2003.

The influence TEG had in the overall game development scene in Lima is hard to map. Their production was certainly remarkable: according to their own records, they released three games commercially (including the first Peruvian independent release, *The King of Peru 2*, and the first Peruvian release in the European market, *Gunbee F-99*), seven games as freeware, two game development code libraries and twenty-six hacked versions of console games. They're perhaps better known amongst players in Lima in the 1990s because of their console hacks: *Fútbol Excitante*, a hacked version of Konami's *International Superstar Soccer* that included teams, players and uniforms from the local football tournament, was a big hit with local players, circulating exclusively through informal markets and to this day being one of the very few references regular players will associate with Peruvian game development. According

Figure 2-4: A screenshot of *Fútbol Excitante*, displaying two of the local teams hacked into the game. Mod by Twin Eagles Group based on an original game by Konami.

to Mr. Byte, the projects they did for consoles became one of the main funding sources for the group because of high demand, but it quickly became troublesome to manage: pirated game distributors were less-than-trustworthy characters, and Mr. Byte described to me how, upon trying to disassociate themselves from one project, group members suddenly found themselves targeted by police agents who went as far as to raid one of their houses, seizing various forms of equipment. After that, the group decided the risk of operating in that market were not worth the potential rewards.

A significant share of this work was just happening through a process of reverse engineering: given the lack of formal training or available documentation, and until access to information through the Internet became widespread, the only way for TEG members to understand how these technologies worked was through elaborate forms of tinkering. They would observe a piece of software operating, paying close attention to how changes on the interface translated to changes in memory addressing and instructions at the lowest level of programming. Based on their reconstructed

understanding of the software, they would then recreate pieces of code until they behaved exactly the same; or they would intervene in the normal operation of a program to inject operations and instructions at that very low level. The relative simplicity of computing platforms at the time played doubly to their favour: given the limited capacity of available technologies, the ceiling for what could be accomplished by smaller groups of programmers was within their reach; while at the same time, user expectations were considerably lower than what one would find today in the market. The Commodore 64 machines on which they began their work on were special in that they made no distinction between user and programmer: to use the machine was to introduce BASIC code into it directly. Software distribution had very little difference from code distribution, a distinctive trait that would vanish over time first with the IBM Personal Computer model, and later with the hegemony of Graphical User Interface (GUI)-based commercial software such as Microsoft Windows. But in the world of the C64, if you could operate a terminal it pretty much meant you could program that terminal to operate differently.

However, TEG's reverse engineering practices were not strictly limited to the technological. At a micro level, TEG was also negotiating their inclusion into global practices of software development and of gaming culture, and negotiating the place for local culture in the emerging transnational world of games. The ideals of the Free Software Movement were just beginning to be crafted through the 1980s, and the open-source operating system Linux would not see a first release until 1991, but the news about these developments had clearly not reached the group when they were circumventing copy protection on software and openly distributing it online —- there is no mention of any of these in their records and, especially, in the issues of their early-90s discmag, *Smiling Panda*.[9] But they were engaging with communities at the international level: their Amiga commercial release, *GunBee F-99*, was distributed and reviewed in Europe, and they have several records of communications with similar cracking and coding groups in Europe, Mexico and Argentina — as TEG's cracked

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[9]*Smiling Panda* was published and distributed as floppy diskettes containing C64 executable code, or as disc images downloadable from TEG's BBS.

software improved in quality it found its way to neighbouring countries, where fellow crackers would write back and share their own works over postal mail. TEG managed to build a transnational reputation when the circuits for doing so were elementary at its best, and it also managed to import a series of practices, attitudes, and beliefs from their connections with the European demo scene. Furthermore, a significant part of their documentation was made available in both Spanish and English, evidencing they understood their audience to go beyond the strictly domestic, or even regional community. In some ways they operated as a bridge between both worlds, for example by actively maintaining a dictionary file to help programmers in the local community better acquaint themselves with technical terms in English commonly found in books and magazines. And their own game production can also be said to exemplify this reverse engineering of global practices: with games such as *Fútbol Excitante*, they were making a global commodity more meaningful to a highly specific local community. In terms of what those representations symbolised, however, they were also opening up a space in which the local community and the local culture could begin to imagine itself as portrayed in games — a space that has become heavily contested and controversial over time.

Yet the fact remains that not only did TEG disappear from the gaming scene in the early 2000s, but it also failed to leave behind a clear legacy. A significant share of older gamers today are still able to identify and relate to *Fútbol Excitante* to this day, but only a small subset of them would know that TEG was behind it, or that it existed at all. For all their efforts and contributions towards bringing together a community of developers, many of their attitudes and beliefs towards the practice of game development would turn out to be divisive over time. The issues of *Smiling Panda* are composed of a series of poorly constructed interviews to group members and friends where they attack, mock, and ridicule people from other groups in no uncertain terms. Their rhetoric was built on an essentialist dichotomy between the categories of "crackers" and "lamers", the latter being a category used loosely to describe people who couldn't code, people who stole other's code, people who relied on game development toolkits and game-making software, or generally anyone who

disagreed with TEG's practices. Their collected archive of Peruvian video games includes a telling disclaimer: "We take in count videogames that were developed by programming them (in assembler or C, mainly). Games made with authoring tools like Flash, game-makers and level map editors will be NOT INCLUDED in this list because those tools do not promote the Investigation, Programming and Optimization knowledgment"[sic]. Because so few people at the time knew much about programming, setting such a high bar for inclusion meant most people going through the learning process would automatically fall under the category of the lamer. Technology evolution also contributed to this, as IBM-compatible PCs emphasised the distinction between users and "professional" programmers with access to development tools, pushing the practices of hacking and tinkering away from everyday computing. Over time, the group would find it increasingly hard to recruit members as it clung to fading technologies such as the C64 and Amiga as generic PCs and video game consoles, which they regarded as inferior machines, began to gain the larger market shares. The group went through multiple cycles of deactivation and reactivation as it reinterpreted its technological base, its operating model, but also as it dealt with the fallout of alienating people in the local development community through things such as *Smiling Panda* — in all fairness, probably just as you would expect from a group of kids who were barely allowed to legally drink, and suddenly found themselves managing a clandestine software distribution network with an international reputation. When I talked with Mr. Byte at his home in Lima, he leans back and smiles when talking about those days — "we were just kids", he tells me in disbelief.

2.5   Local Area Networks

The video game industry in the early 2000s looked very differently from what it looks like even just a decade later. The big splits in the gaming community were perceived mostly in terms of platform selections, with big camps around console gamers and PC gamers. Multiplayer experiences were limited to concurrent forms of play on console games, or Local Area Network (LAN) play for PC games. Because of the cost factor

associated with both these forms of play experience, access remained limited in the Peruvian market throughout the 1990s for play experiences within the home. Instead, alternative environments of play became increasingly popular, and were collectively referred to as *"vicios"* (literally, "vices"). *Vicios* became very popular especially in lower and middle class neighbourhoods in cities (and then again, primarily in Lima), where families had a smaller chance of getting access to their own hardware at home. Console-based *vicios* would regularly operate at some neighbourhood home or commercial establishment, where the operator would set up a bunch of television sets connected to consoles, and players — usually kids and teenagers — would rent out time on one of those consoles and play any of the games available in the vicio's collection during that time. Time was rented by the hour and was usually very cheap, and because operators were often known in the neighbourhood there was not too much concern (at least initially) about kids spending time in the establishments. This sort of operation made it possible for gaming to become a media experience available to people across social classes, and it also structured the play experience as considerably more social than it would have been for kids had they had the hardware available to them at home.

A similar thing happened with PC-based *vicios*, although in their case operations tended to double as Internet cybercafés at least for part of the time. Internet cyber-cafés, known locally as *"cabinas públicas de Internet"* or "Internet public booths", became very popular throughout the 1990s and the main vehicle for Internet connectivity for most of the population until very recently in Peru.[10] Precisely because they became so popular, competition was fierce and prices were extremely low, effectively precluding operators from any business model other than just sustainability. Some operators started incorporating gaming options as a way to diversify their offerings, including setting up more powerful hardware to withstand the requirements of popular games, as well as networking features such as hardware and protocol layers to improve the gameplay experience (El Comercio, 2008). In some cases, operators

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[10]Public Internet access through cybercafés was an important driver for connectivity in many countries in Latin America during the 1990s and 2000s. Cf. Proenza (2012) for an updated take on its impact in several countries.

would set up a separate room within their facilities specifically for gaming, both to isolate the noise from the rest of the patrons and to provide a distinct experience for players — a cybercafé I recall visiting frequently in the 1990s would have the gaming machines in a darkened back room, with graffitis and player nicknames all over the walls and black lighting defining the ambience — or, when their client base became so inclined, would just change their focus entirely to games, with Internet access becoming a secondary focus. Playing in *cabinas* became popular enough that it got its own verb — *"cabinear"* — and would become a regular activity even for kids who did have access to the hardware at home.

Unsurprisingly, these seemingly unregulated and unsupervised play spaces — where kids were getting exposed to new, poorly understood forms of media and entertainment often including graphic depictions of violence — began to draw attention and to become the focus of a new generation of moral panic surrounding kids, media and technology. The first systematic study of the relationship between video games and children done in Peru that I've been able to find was published in response to this moral panic: in 1996, María Teresa Quiroz and Ana Rosa Tealdo published *Video- juegos o los compañeros virtuales* (Quiroz & Tealdo, 1996), notable in that it was the first attempt to respond to these growing anxieties with actual research and data. Quiroz and Tealdo attempted to situate the video game experience in the context of other media experiences and studies, and through interviews and surveys administered to school-age children they wanted to find out what kids were actually thinking about, rather than what adults were claiming kids were thinking about. While their study had little impact on the public perception of games, it is nonetheless interesting because of its attempt to open up broader conversations and considerations regarding the impact of games and the social context in which play is happening:

> From the point of view of intergenerational communication, it could be said that there is a sort of transmission of the "knowledge" of games taking place that resembles what oral tradition is like. (...) Obviously games are, too, a cognitive exercise, and in that sense, small children are unaware of "being playing". For them, games are a serious activity,

we could even say constructive, in that it works towards constructing and developing intelligence, exercising symbolic thought, assimilation and accommodation. (Quiroz & Tealdo, 1996, pp. 43-45, translation mine)

The knowledge transmission that was taking place in the *cabinas* and *vicios* began to articulate into strong community ties over time, as people who patronised individual establishments would become acquainted with each other through play, and hierarchies would form based on skill and dexterity. The communities that formed around *cabinas* and *vicios*, in turn, became over time the foundation for teams and leagues of competitive play, with teams establishing their home base and their training regime around a specific *cabina* — often receiving support from operators who would allow them to pull training all-nighters at a discount. The more experienced players would often help newer players in understanding strategy and tactics for a game, and in this way, they developed and established their expertise and credentials as resident specialists. Almost a decade later, many of the Peruvian players currently on international professional circuits such as the World Cyber Games (WCG) had their start playing in the *cabinas*, with many still doing so for training purposes (Gestión, 2013a).

The evolution of these play spaces is also interesting for two additional reasons. On the one hand, because they were, for many people currently in the industry, an initial point of contact with the universe of gaming, as they provided an affordable access point with a wide distribution. As I heard consistently when interviewing developers, *cabinas* and *vicios* had been in many cases not only forms of entertainment, but also the beginning of their engagement with games more broadly. On the other hand, the spaces themselves went through a process of formalisation and professionalisation, as competitive gaming went from being a hobby, to an interesting niche, to a sizeable business opportunity — not only in Peru, but around the world (Taylor, 2012). While the original tournaments were largely community affairs, more recent editions are already attracting big brands and, consequently, finding it necessary to "clean up their act" just enough that sponsors will be willing to get involved, and players will still feel the space as their own.

This trend towards a cleaner, more formal scene was in line with larger changes in the game industry happening through the 2000s, and that would also impact the game development industry directly. Both *cabinas* and *vicios* made sense as play spaces because games were mostly bound to either consoles or PCs. With the industry so heavily configured around the hardware, it seemed at the time hugely unlikely that a Latin American video game industry would emerge that would be anything other than cheap labour assembling consumer electronics (Lugo *et al.* , 2002) — certainly not the most exciting of prospects. TEG had proven that making games, even in this landscape, was indeed possible; its decline had also clearly shown how little command was available over the rest of the value chain for a group to get a product out to the market.

But the entirety of that value chain would significantly change in the course of a decade. When Valve Software introduced Steam in 2003, a new digital distribution platform specifically for games, nothing materially changed overnight around how games were circulated. But it did introduce a series of new possibilities for people to imagine: Steam (or rather, digital distribution) offered, at least in theory, the prospect of developing a game anywhere in the world, and then being able to sell that game to players anywhere else in the world. If your local market was underdeveloped or small, you could theoretically reach a massive audience spread out around the world. In other words, digital distribution introduced the possibilities of Chris Anderson's long tail model to the world of games (Anderson, 2008). Given the Internet, your potential audience was the entire world — or at least, that was the promise on paper.

The prospects of digital distribution became even more interesting as they decoupled from the desktop computer. Newer generations of consoles also introduced some mechanism for digital distribution of content, in an effort to not only introduce channels for selling games to customers, but also to engage more broadly with the growing independent development community. The introduction of mobile phones with increased computational capacity — smartphones — along with faster persistent data connections shifted what gaming and gamers looked like, and the platforms for content and software distribution that came along with them (such as Apple's

iTunes App Store or Google's Play store) essentially created entirely new audiences for games, including audiences who would be hesitant to self-identify as "gamers". New devices and new audiences also implied new experiences related to gaming and play in new contexts, leading to the appearance of "casual games", as described by Jesper Juul: "games that are easy to learn to play, fit well with a large number of players and work in many different situations." (Juul, 2012) Especially for independent developers, casual games and mobile devices meant a significant increase in their potential reach: console development implied gaining access to heavily policed and protected walled gardens, making PC game development the chiefly viable independent option. Smartphones, without being universally accessible or immediately available to anyone, still created a significant expansion in the possibilities.

Just as distribution and consumption were undergoing heavy transformation, so was production. Many new options for game development have become available in the last few years, beginning with Adobe Flash, which made simple animation for the web more affordable and accessible (and coupled with Actionscript, Flash's built-in scripting language, capable of handling events and actions in a game) because of its huge installed base. The evolution of the HTML5 standard and various forms of Javascript libraries for game development have made it considerably easier to develop games for distribution through the web for desktop computers or mobile devices — at the same time, allowing for content distribution without the need for additional plug-ins such as the Flash player. Additionally, new options are now available for game development engines that are powerful and considerably more affordable than popular commercial options in the past. Released originally in 2005, the Unity game engine — a darling of the independent game development community, regularly sponsoring events and conferences and actively engaging developer groups — enables people to develop complex 3D games at a fraction of the cost of building the same toolkit on their own, while also having the option of exporting binaries for multiple platforms from the same codebase. Similarly, the Construct 2 game engine, developed since 2007, provides tools for simplified HTML5 game development, with its output being compatible with multiple platforms and mobile-friendly. While game development

is by no means easy, the evolution of these tools, frameworks, libraries, and engines has made it considerably easier than it was, for example, during the time TEG was active.

But I do not wish to give the impression that because game production, distribution, and consumption were undergoing transformation and expansion, the industry was somehow becoming more open, welcoming and easier to navigate. While these largely technical changes created new opportunities, they also generated their own challenges. As an illustration, while digital distribution made it easier to reach wider audiences, it also made the environment more competitive with thousands of projects now competing for the attention of a more fragmented audience. Similarly, the introduction of casual games required new design and marketing approaches and introduced tensions between "hardcore" and "casual" gamer markets. And the expansion in development tools and resources opened up new creative opportunities for game developers, but it didn't necessarily make the process of getting a game out to players any simpler.

The structural transformation of the gaming industry did mean that institutions built on top of it were forcibly reconfigured. In the Peruvian context, for example, it has translated into a diminished importance of the role of *cabinas* in providing a space for general gaming experiences, and the almost complete disappearance of *vicios*. And it should also lead us to re-examine the claim that a Latin American gaming industry would be impossible except for low-cost console manufacturing, or similar forms of precarious technology transfer. For one, the story of TEG is a clear indicator that video game development was already happening at the informal and non-commercial level. And these structural changes in the industry opened doors and windows of various shapes and sizes for new people to become engaged with game development. A clear example of this shift can be found in the story of Bamtang Games, the largest and most successful video game studio to come out of the Peruvian industry, which began operating in 2003 — precisely the same year that TEG was coming to its end.

Bamtang Games is an illustration of how the game development industry underwent a formalisation process of their own through the 2000s, distancing itself from

its grittier roots and attempting to develop a clearer understanding of what it meant to operate as a game studio. Right from the start, Bamtang was set up as legally constituted organisation, fulfilling tax obligations and providing full benefits to the members of its very small team (no more than six people through at least its first three years of operation) — on account of one of its founders having a background in law and wanting to make sure they were covered on all grounds. For a long time, Bamtang operated basically as a research organisation, working on a physical boxing game prototype which required significant investment in both hardware and software development, most of it done in-house, while at the same time trying to figure out how the market and the industry operated in order to secure distribution for their game. Even though their early physical prototype was never released, it provided them with enough understanding of how the industry operated and enough exposure internationally through venues such as the Game Developer Conference (GDC) in San Francisco, California, that they were able to shift their own expectations and reconfigure their operation around game development for desktop and the web, using Macromedia (later to become Adobe) Flash. For almost three years, Bamtang was essentially going through a learning process, both technical and operational.

With the creation of Bamtang begins what I consider to be the second stage in the history of Peruvian video game development — when a largely informal creative community began to move from the hobbyist/hacker mentality towards the independent developer ethos. Bamtang became the first experiment of this new era, but just as it illustrates a significant shift in practices and attitudes, it is also a highly exceptional case that can hardly be said to stand for the entirety of the industry. For one, Bamtang was able to put together enough resources to sustain itself through its learning and research process. For another, the studio was founded on the premise that it would aim directly for the international market and totally bypass the domestic one, because it was so riddled with piracy issues it would just prove unsustainable. Even further still, Bamtang was founded by people with significant professional experience in different fields — and while they did not have a clear understanding of the game industry when they started, it spared them from having to figure out legal,

Figure 2-5: Opening screenshot for *Adventure Time: Righteous Quest.* Developed by Bamtang for Cartoon Network.

accounting and other operational issues just as they were trying to get a sense of the games component. These three characteristics already set Bamtang apart from many other game studio projects in the Peruvian game industry, but while they may make Bamtang exceptional, they also stand as indicators as to things the broader industry needs to establish successful, sustainable operations.

All of which brings us, after doing this long and diverse historical overview, closer to the current configuration of the Peruvian video game industry, and the result of its evolution and its practices. To understand how the video game industry has come about and what's at stake in its growth and existence, it is important that we have a historical sense of how technological processes have unfolded throughout Peruvian history and how they've been connected to larger negotiations of agency around the economy and the deployment of the structures considered to make a nation "modern". Conversely, it is important to understand how the history of game development provides an interesting counter-narrative to the way technology is usually deployed in countries such as Peru, pointing in this case to the creative activities informal communities are already deploying on their own. Finally, an overview of

how the game industry has been structurally transformed over the last decade, and how that has been correlated to the transformation of the institutions that configured game culture and industry in Peru, provides us with the platform from which we can zoom in for a closer examination of what the industry looks like today — beginning with the ways in which developers are engaging the industry, picking up skills, building expectations, and exploring new creative opportunities.