RESEARCH PROPOSAL:

PERVASIVE TECHNOLOGIES:

ACCESS TO KNOWLEDGE IN THE MARKETPLACE

Summary

Problem Statement

Pervasive technologies (mass-market networked communication technologies) are transforming the way in which people across the world access knowledge media. The prices of mobile phones and netbooks have plummeted, even as penetration and use have reached near-ubiquitous levels. In many ways, these commercial devices are fulfilling the promise that socially beneficial initiatives like One Laptop Per Child were never able to fully deliver on.

In China, hardware manufacturers invent, remix and recreate technological devices that have an unclear relationship with the law, if not in China, then at least elsewhere in the world. In India, software developers change content (and its interplay with hardware) in surprising ways, often confounding the original intentions and legally-protected boundaries of the content. In a majority of countries in Asia, domestic web portals and content sources dominate the market, without always being in agreement with domestic and international copyright law.

To a large extent, these third-world pervasive technology players have been able to affect access to knowledge more significantly than any number of good intentions, and yet they have rarely been the subjects of scholarly research and investigation, especially as means to an end of a social good.

Research Questions

- What is the relationship between the production/deployment of pervasive technologies and intellectual property?
- What lessons does this hold for the future of both intellectual property and access to knowledge?
- What would it mean for these technologies to be produced and used in an intellectual property regime like that of the European Union, and indeed, would they have any future under the world's strictest copyright and patent laws?

Aims

- To appreciate the role that pervasive technologies play in providing access to knowledge.
- To understand the complex interplay between pervasive technologies and intellectual property.
- To use research outputs to support intellectual property norms that encourage, not inhibit, the proliferation and further development of such technologies as a social good.
- Towards the beginning of the research cycle, and once the agenda is finalised, to identify a selective list of advocacy opportunities that will be fitted in to a few distinct advocacy campaigns that continue to be developed alongside the research.
- Towards the end of the research cycle, to strategically position research outputs within relevant and opportune policy windows that are available and have been identified; to simultaneously engage a broader community with the outputs so that outcomes can be maximised.

Scope

This project will be constituted by research projects that emerge from a call for papers under the rubric of a comprehensively explained programme concept. The following limitations will be applied to the project:

- By pervasive technologies, we mean technologies that include (but are not limited to) mobile telephones, netbooks, e-book readers, media players, gaming consoles and web-based internet technologies. Typically, and unless there is an exceptional reason for inclusion, non-networked technologies (e.g. DVD player) will not belong to this category. Both hardware and 'software' are considered legitimate kinds of technology; and the category of software also comprises content (or media).
- Intellectual Property for the purposes of this project will largely consist of copyright and patent law, primarily because of the richness of the material in these two aspects. While the somewhat distracting (albeit widespread) misuse of trademarks in Asia is important, it is not in itself central to core access to knowledge concerns.
- Geography in this project will consist of India, China and selected developing countries from Asia; the emphasis will be on comparability, in terms of generating evidence that can be used nationally, regionally and internationally.

Change Objectives

The overarching change objective of our cumulative research output is to be able to provide intellectual property policy-makers with compelling and new evidence regarding norms that promote access to knowledge. *Compelling* because the industry under focus here is both economically important and an established presence in the formal and informal sectors; *new* because perspectives from this industry have never been represented as a policy concern and certainly not as an access to knowledge issue.

The modes of campaigning for access to knowledge in intellectual property policy thus far have consisted of either pushing for expanded limitations and exceptions in law or promoting open licenses. Intellectual property reform initiatives largely depend upon scenarios of what access to knowledge could be if reform were to take place, and in that sense, live strictly within the law. Open licensing initiatives also live within the law, by working out a way to go beyond it, thus providing a legal means by which it may be subverted. The networked communications technology industry provides a crucial outsider perspective, perhaps akin to piracy, where the law, in many cases, is simply ignored.

The nature of this industry is somewhere between formal/informal and legal/illegal; the exact state varies, depending on the life-cycle stage of the product category and the company in question, and the exact wording of the law in the country that the technology is developed, as well as the country/ies in which it is eventually used.

Towards this end, two other points are worth noting. One: pervasive technologies *already* exist; they are an access to knowledge solution that has happened. In this sense, they offer a positive frame by which to approach access to knowledge, in contrast to complementary intellectual property reform initiatives which focus on deficits. Two: Traditionally, actors in intellectual property reform have tended to go solo, and a (perceived) conventional opposition has been that between consumers and producers. In this case, given the relatively disaggregated and relatively under-capitalised nature of the sector, there is a useful alignment of the interests of all concerned, a confluence of both producers *and* users of this technology.

Modality

- Inception Phase: Development of a detailed methodology guide and identification of research partners across Asia.
- Research Phase: Commissioning of multiple research projects through a combination of open call and “search and selection.” Identification of policy windows, design of advocacy campaigns, development of advocacy materials and engagement with policy-makers and boundary partners. Overlaps with:
- Dissemination and Advocacy Phase: Publication of research outputs and closing of formal advocacy activity.

Project Background

Overview

The astounding growth of pervasive technologies in Asia is usually reported and analysed in mere economic terms. A lesser known consequence of this phenomenon is the vastly greater facilitation of access to knowledge (a2k) than at any point before, and a lesser examined aspect of this phenomenon is that is fuelled by industry actors who don't always function within the regulated global economy, especially when it comes to intellectual property rights (IPR).

The basis for the pervasive technologies phenomenon is amply clear in a continent that accounted for 46% of all mobile phones in the world in 2009[1]. The International Telecommunications Union (ITU) tracks the state of communications technology in countries around the world, and the figures for China, India and Indonesia (to name just three developing countries in the region) for 2009 speak for themselves[2]:

Country	Number of telephones (2009)	Compounded Annual Growth Rate	Penetration
China	747,214,000	17%	117%
India	525,099,000	59%	44%
Indonesia	159,247,000	39%	70%

What is interesting here is *how* the pervasive technology revolution has become what it is. Underlying the hardware involved, for instance, is the under-reported but unsurprising fact that in terms of total market-share, big brand names are losing ground to small brand names. In the last three years (2007-2010), while established market players like Nokia have seen their market share in India steadily dip, smaller players who are either based in China or source hardware from China like G'Five, Micromax and Spice have seen their market share steadily grow[3]. Accompanying this surge in hardware production is the growth in both software development and web content, often in a disaggregated and renegade manner, and without attention to compliance with prevailing intellectual property (IP) norms and laws. (*Note:* Some pointers on the nature

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[1] http://blog.euromonitor.com/2010/03/regional-focus-asia-pacific-the-worlds-largest-mobile-phone-market.html

[2] International Telecommunications Union, 'The World in 2009: ICT Facts and Figures' available at http://www.itu.int/ITU-D/ict/material/Telecom09_flyer.pdf

[3] For example, see: http://www.zdnet.com/blog/india/surprising-mobile-handset-market-report-from-idc-india-has-nokia-miffed/193; http://www.idcindia.com/Press/27dec2010.asp; http://www.ciol.com/News/News-Reports/Nokia-leads-Indian-mobile-handset-market,-but/145117/0/

and size of these markets are provided in the next section).

The renegade nature of the hardware, software and content industries that are fuelling the pervasive technology revolution is worth taking seriously, and worth viewing in a framework outside their immediate economics. Why? Simply put, the underrated work of these pervasive technologies is a2k; by providing a means by which media can be consumed, made and recirculated, they are facilitating knowledge goals in a manner and at a scale that non-profit, activist interventions have often been unable to do.

The work of mobile phones in particular, and information/communication technologies (ICTs) in general, as facilitators of education and livelihoods has been extensively documented[4]. There is more or less universal cognisance of the fact that communication itself is a form of knowledge. However, if one treats a2k as a distinct social movement that emerged at the cusp of the 20th and 21st centuries with a particular focus on IPR - as important literature on the subject suggests[5] - then there is distinctly not enough work that frames greater or increased a2k as a *positive externality* of pervasive technologies.

Consequently, to understand how pervasive technologies came to be is to understand how we can preserve the a2k they enable. Conversely, a failure to understand the environment in which they function, especially in terms of their interaction with local and international intellectual property (IP) norms, creates a vacuum for policy within which the current and potential a2k that pervasive technologies enable could be jeopardized.

Why is this research crucially important at this point in time? Developing countries in Asia are located between a past where economic policy was less multilaterally decided, and a future which involves a greater degree of integration into the world economy. Topics such as a2k and IP meant much less to developing countries the world over prior to the founding of the World Trade Organisation (WTO) in 1996, in part because it is precisely the global regulation of IPR that has precipitated - or brought into focus - a concurrent crisis with access, whether to knowledge or medicines. While the economic opportunities afforded in a new era of integration are enormous, it is equally important that policy and law takes into consideration public interest, societal experience and historical learning when making decisions affecting industries that in turn affect a2k.

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[4]For two recent examples of work, which include within a wide set of references to ICT connections with information, education and livelihoods, see: http://www.enrap.org/research/icts-for-livelihoods-research/icts-for-livelihoods-research-papers/ and http://www.ejisdc.org/ojs2/index.php/ejisdc/article/viewFile/529/265.

[5]The body of academic and policy literature on a2k is vast and rigorous. Among the more important papers that describe the phenomenon of a2k as a movement encompassing activist work on both copyright and patents is *The Access to Knowledge Mobilization and the New Politics of Intellectual Property*, Amy Kapczynski, 117 Yale L.J. Pocket Part 262 (2008), http://thepocketpart.org/2008/06/01/kapczynski.html; among the more important books that catalogue the history, present and future of this movement is *Access to Knowledge in the Age of Intellectual Property,* edited by Gaelle Krikorian and Amy Kapczynski, (New York, NY: Zone Books, 2010).

Industry (especially the intellectual property industry) is, by its very nature, predisposed to its own interests, which are sometimes narrower than those of the society it is in. Equally, but not proportionately, civil society formations - such as the a2k movement and the access to medicines campaign - are yet only peripherally concerned with the evaluation of existing a2k, as enabled by market forces such as pervasive technologies, even while their work in critically examining intellectual property is invaluable.

A useful analogy to underscore the importance of this market-based link to a2k is another market mechanism: piracy. Across Asia, piracy is a recurring theme. India and China, to be sure, are seen as hotbeds of piracy. China is frequently said to be the source of 70 per cent (and in some claims, 80 per cent) of goods seizures for intellectual property violations worldwide[6]. India has similarly always found itself being listed on the priority watch list – as a piracy concern – in the 'Special 301' report[7] brought out annually since the late eighties by the United States Trade Representative[8]. Despite the threats, it is now widely acknowledged that piracy is a valuable access mechanism in many parts of the developing world. And due to the spurt in academic and policy oriented work on piracy - boosted by concerns about and around electronic piracy and peer-to-peer exchanges in the developed world - there is now a robust body of literature that informs policy-makers of the context that it is located in[9]. This context is invaluable for a2k; it is public, it leads to public debate and consultation, and finally, it serves as a real or potential bulwark against industry-led decisions on piracy being implemented as government policy.

The claim, in summary, is this. Pervasive technologies are a market mechanism to be reckoned with and are central to increasing a2k. Many of the pervasive technologies that exist in India, China and other parts of developing Asia have a legally tenuous relationship with IPR law, and - like piracy - are in imminent danger of being deemed illegal and therefore extinguished. Unless we can make a case for taking their context seriously on the basis of their consequence to greater a2k, we are in danger of overlooking and subsequently losing a fundamental knowledge-enabling system for people who need it the most in developing countries in Asia.

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[6]Victoria Espinel, the US Chief IP Enforcement Officer, estimated that around 80 per cent of the counterfeit goods seized by the U.S. Customs is of Chinese origin. http://www.reuters.com/article/idUSTRE66K3LH20100721. The International IP Alliance, a US copyright industry lobby group, estimates lost sales (of American films, music, software and video games) of more than USD 3.5 billion in China. Another report, relying on German officials, quotes Chinese contribution to worldwide counterfeit and piracy to be 70 per cent and a loss of USD 300 billion lost due to Chinese piracy. http://www.spiegel.de/international/spiegel/0,1518,402464,00.html. However, experts haveThe often deposed before the US government to present testimony on how the piracy statistics are greatly exaggerated: http://www.chinalawblog.com/2010/06/china_intellectual_property_the_statistics_are_damn_lies.html.

[7] http://www.ustr.gov/

[8]http://www.cis-india.org/advocacy/ipr/blog/2010-special-301

[9]For instance, recent work from IDRC and the SSRC/Sarai has produced this statement made to WIPO in September 2010: http://www.wipo.int/meetings/en/doc_details.jsp?doc_id=142793

Pervasive Technologies, a2k and Development

As Peter Drahos puts it, "Knowledge underpins everything, including economies"[10]. The a2k issue, therefore, impacts all aspects of development – education, health, environment, livelihoods and human-rights/governance. The intersection of IPR and pervasive technologies is most visible in education and livelihood - the traditional base of the a2k movement - and subsequently forms the focus of this project. Consciously, this project sidesteps other potential intersections of IPR and development – for example, the use of trademark law to prevent free expression, or the use of digital rights management to infringe on privacy - as these are full subjects of inquiry within themselves and do not form the core of what constitutes a2k.

The issue of knowledge is particularly important in India and China given the state of the education system. According to UNDP, the “hybrid combined gross school enrolment ratio in education” for India and China are 68 and 62 and the “adult literacy” is 68.3% in India and 94.2% in China. Adult literacy indicators tend to be inflated since many government officials feels that sign their names or do basic number operations. The mean years of schooling in India and China are 4.4and 7.5[11]. These indicators place India and China at 129 and 88[12] out of a total of 177 countries on UNDP's Education Index, an obviously unsatisfactory situation given that the majority of the world's students come from these two countries. On a potentially positive note, this deficit provides both countries with an excellent opportunity for harnessing pervasive technologies in non-formal and life-long education for those who whom the traditional educational system did not reach.

In 2005[13] Consumers International (CI) published a revealing Asia-wide study which highlighted, among many other things, that India and China's copyright laws don't take full advantage of the exceptions and limitations afforded by TRIPS; instead, and even more unfortunately, the study pointed out that both countries have provisions that implement the WIPO Copyright Treaty (WCT) and the WIPO Performances and Phonograms Treaty (WPPT) without being signatories to either of them.

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[10]Drahos, P. 2005. Time for an A2K Treaty? Bridges, 9 (4), April 2005.

[11]UNDP Human Developemt Report. Page 145

[12]Worldwide Trends in the Human Development Index 1970-2010 http://hdr.undp.org/en/data/trends/

[13]Copyright and Accesss to Knowledge: Policy recommendations on flexibilities in copyright law http://a2knetwork.org/sites/default/files/a2k-report.pdf

Further reports from CI in 2009[14] and 2010[15] revealed that while limited fair-use/fair-dealing provisions exist in both India and China, it is not clear whether all students are allowed to photocopy books *in toto* as is usually the practice in higher education. Also, these fair-use/fair-dealing provisions don't clarify whether they are applicable in non-traditional learning situations, for example, in the case of distance, non-formal and life-long learning and education.

The CI studies went on to suggest that even when fair-use/fair-dealing was exercised, it was exercised with a sense of guilt and apprehension, given the ambiguity in the law, the propaganda by rights-holders and the risk-averse nature of educational institutions. Part of the reason that there is wilfully perpetrated confusion, ambiguity and danger around what copyright law allows and does not, is that industry lobbies have traditionally led public discourse around copyright infringement and alleged instances of it. A key tactic in this industry-led strategy is to estimate piracy as a direct, monetary loss, and thus equate it with theft.

PEOPLE'S REPUBLIC OF CHINA
Estimated Trade Losses Due to Copyright Piracy
(in millions of U.S. dollars)
and Levels of Piracy: 2004-2009[1]

INDUSTRY	2009		2008		2007		2006		2005		2004	
	Loss	Level	Loss	Level	Loss	Level	Loss	Level	Loss	Level	Loss	Level
Motion Pictures[2]	NA	NA	NA	NA	NA	NA	NA	NA	244.0	93%	280.0	95%
Records & Music[3]	466.3	90%	564.0	90%	451.2	90%	206.0	85%	204.0	85%	202.9	85%
Business Software[4]	3412.4	79%	3005.0	80%	2999.0	82%	2172.0	82%	1554.0	86%	1488.0	90%
Entertainment Software[5]	NA	NA	NA	NA	NA	95%	NA	NA	589.9	92%	510.0	90%
Books	NA	NA	NA	NA	52.0	NA	52.0	NA	52.0	NA	50.0	NA
TOTALS	3878.7		3569.0		3502.2		2378.0		2643.9		2530.9	

Industries and their lobbyists have often been behind a series of methodologically dubious and often contradicting reports on IP infringement. As one of their many tables[16] quoted above indicates, piracy is rampant in both India and China and serves as the primary mode of a2k for most of the two countries' citizens.

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[14]Consumers International IP Watch List Report 2009 http://a2knetwork.org/consumers-international-ip-watch-list-report-2009

[15]Consumers International IP Watchlist Report 2010 http://a2knetwork.org/summary-report-2010

[16]China: Intellectual Property Infringement, Indigenous Innovation Policies, and Frameworks for Measuring the Effects on the U.S. Economy – a written submission by International Intellectual Property Alliance (IIPA). http://www.iipa.com/pdf/IIPAChinaITCWrittenSubmission070910.pdf

According to the Business Software Alliance (BSA) the piracy 'rate' for China and India was 79% and 65%[17] respectively, with losses of 7.5 and 2 billion USD. Each year, the USTR inevitably places India and China on the “priority watch list” of the Special 301 report. The International Intellectual Property Alliance (IIPA), an industry-led lobbying concern, estimates that in China, piracy serves 80% of the market in most copyright sectors[18]. A few years ago, a government official estimated that 500 million pirated books were published per year in China[19].

As such, the escalation of copyright piracy to a major multilateral policy issue that can potentially block a2k in developing countries in Asia is ominous; pervasive technologies that ply in similar informal market dynamics are subject to exactly the same escalation.

In the domain of education, IPR in particular copyright law impacts the cost of text books (core curriculum and additional reading), academic peer-reviewed journals, educational resources, educational and generic software, scholarly databases and learning management systems. The result is that most student are only exposed to the core curriculum texts, the libraries in most institutions subscribe to a handful of journals, there is limited exploitation of the potential offered by ICTs and often even teachers are starved for intellectual stimulation. In addition, technologically mediated peer-exchange of learning material by students is usually frowned upon or ignored by the faculty and the management, given their limited and over-cautious interpretations of copyright law.

Accessibility of copyrighted works via exemptions for disabled people are also critical for countries like India. Accessible works not only directly benefit disabled people and the elderly, but also could potentially benefit other sections of society provided laws are modified suitably. People who could benefit from accessible provisions in law include: (a) illiterate and newly-literate people (b) those users using legacy or refurbished hardware and (c) mobile phone users who don't have access to the Internet – by employing text-to-voice in combination with voice recognition or interactive voice response.

Both copyright and patent law impacts livelihoods and/or entrepreneurship in a wide variety of ways – including but not limited to (a) increasing the economic threshold for starting a new business, product and service (b) increasing the legal due diligence required to start a new business, product and service (c) reducing the profitability of the business because of outgoing royalties and rents and legal expenses (d)

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[17] Seventh Annual BSA/IDC Global Software Piracy Study. Pages 8 and 12. http://portal.bsa.org/globalpiracy2009/studies/09_Piracy_Study_Report_A4_final_111010.pdf

[18] See: http://www.iipa.com/rbc/2010/2010SPEC301PRC.pdf

[19] Article from China Daily titled “China wages war against piracy” http://www.chinadaily.com.cn/china/2007-03/17/content_830307.htm

undermining the potential to scale beyond national boundaries, given that this is the primary opportunity provided by the Internet (e) increasing the uncertainty of businesses, products and services given the risk of litigation. As a result, small-to-medium businesses and micro-entrepreneurs in India and China usually ignore IPR and only begin to develop protection and risk-mitigation strategies when they have scaled up.

Prior to the advent of pervasive technologies, underprivileged sections of society rarely had to deal with complications around IPR because they were not connected to the global information economy. In the early years of the internet, this question was cast in terms of "how to bridge the digital divide." It was clear then, as now, that access to the internet could dramatically change the way citizens, especially those in poverty, could interact, learn, live and grow. And yet, from that time to today, the digital divide has been bridged - not by the proliferation of broadband networks and high-cost desktops and laptops, but by pervasive technologies. Thus, for instance, while mobile phone penetration in China and India (for 2009) was estimated at 117% and 44% respectively, it is worth noting in comparison - and stark contrast - that internet penetration (for 2010, estimated[20]) in China and India is merely at 31.6% and 6.9%.

It is not an exaggeration to say that pervasive technologies define the networked digital landscape in Asia, and will continue to in the near future. Many of these pervasive technologies have a risky relationship with the law as far as IPR is concerned. Given that these technologies are facilitators, enablers and *makers* of knowledge, there is little doubt that the future of knowledge in Asia hinges on the survival of this elusive set of market actors.

[20] See: http://www.internetworldstats.com/stats3.htm#asia

State of the Debate

It is generally accepted that intellectual property licences increase the cost of products and services, often sending them beyond the reach of ordinary consumers. From our review of literature, media articles and interviews with experts, the following trends emerge.

The state of the debate, as summarised below, is divided into three sections:
1. Hardware
2. Software
3. Online and mobile content

For hardware we focus on case-studies in China around standards for pervasive technologies such as Time Division Synchronous Code Division Multiple Access (TD-SCDMA), Code Division Multiple Access (CDMA), Enhanced Versatile Disk (EVD), Digital Video Disk (DVD), and WLAN Authentication and Privacy Infrastructure (WAPI). As regards software our focus is on the non-mainstream Indian information technology sector. For online and mobile content we have looked at instances of interest in both India and China.

Hardware

There is a fair amount of academic and journalistic literature around the Chinese manufacture of pervasive technologies and their inevitable patent issues. Much of this comes from within China itself, and is in Mandarin. However, a fair amount of the literature is also in English. Given the size of China's manufacturing sector and consistent attempts to limit the country's overseas royalty exposure from at least since the mid-1990s, the level of scholarly interest here is quite understandable.

From the survey of the literature, a few important points are borne out:
a) there is significant IP in pervasive technologies;
b) IP increases the cost of hardware, often substantially;
c) patent thickets and patent royalties make it more difficult for new entrants in the market as well as for domestic manufacturers to compete in the global marketplace;
d) governments configure industrial policies, including IP and standards policies, to reduce outgoing royalties and maximise domestic IP;
e) governmental policy interventions have in some instances led to price drops for both manufacturers as well as consumers.

Significant IPR in pervasive technologies.

In the case of the DVD format, an independent analysis of essential patent claims in 2004 revealed that there were 311 essential US patents for DVD players and 272 essential US patents for DVD recorders, which were covered by two patent pools (Nagaoka et al. 5).

Similarly, on CDMA and related technologies, including WCDMA, Qualcomm has 5700 US patents and patent applications (Chen 16). The Chinese have themselves been patenting mobile telephony technologies. As of October 2006, there were 214 patents related to TD-SCDMA filed in China's State Intellectual Property Office. (Marukawa 18). Increasingly, Asian companies have been filing for a large number of patents in the US and at the European Patent Office. Hon Hai Precision Industry - a Chinese company, which through its subsidiaries like Foxconn manufactures devices like the iPad, the iPod and the iPhone, applied for 1,438 patents in the US last year - a much higher number than the 563 patents applied for by Apple in the same period (IFI CLAIMS). In 2009 the Chinese State Intellectual Property Office accepted just under a million patent applications, and collectively and cumulatively till then had granted 1.5 million patents.

Huawei is amongst the world's largest patent applicants; by September 2008 it had filed 32,822 patent applications.[21] Huawei holds around 7% of all essential patents for Universal Mobile Telecommunications System (UTMS), a 3G technology, and between 15-20% of all essential patents over 3GPP LTE (a new mobile communications technology standard).[22]

Patents increase the cost of hardware.

A number of standards (along with associated patents) provide good examples as to why patents are increasing the cost of hardware. Dan Breznitz & Michael Murphree note that by "passing mandatory standards in consumer and other technologies will raise China's level of technology, prevent royalty fees payment to foreigners, and increase China's ability to force technology sharing and transfer from foreign partners."[23]

A primary reason for the development of the TD-SCDMA mobile telephony standard seems to have been the reduction in patent licensing costs. Marukawa notes, "another

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[21] According to 2009 WIPO statistics, Huawei was the world's largest patent applicant, having applied for 1737 patents through the PCT process in 2008, of a total of 6089 PCT applications from China.

[22] http://www.huawei.com/ipr2.do

[23] Dan Breznitz & Michael Murphree, *The Simple Logic of Perceived Madness in China's Technology Standards Policy* 11, available at http://www.moore.sc.edu/UserFiles/moore/Documents/CIBER/Breznitz-Frontiers09.pdf

advantage of SCDMA for its developer is, by adding 'S' (synchronization), its developers can claim that it is a different technology from CDMA which Qualcomm holds most of important patents. This must be the reason why Zhou, Li, and Xu proposed to develop an indigenous telecommunication technology on the basis of SCDMA."[24]
The same holds true with the DVD standard as well. In 2006, Ma Jun, Deutsche Bank's chief China economist stated, "There is almost no profit for Chinese DVD makers as they have to pay about $US7 in licensing fees to foreign patent holders per DVD player, which are sold at around $US20 only - both at home and abroad."[25] Another estimate places the royalties in 2002 at around US$27.45 per unit, being between 20 to 30 per cent of the production cost of each DVD player then.[26] The difference in royalty rates being explained by the drop caused in those intervening years by other factors, which will be discussed later.

According to an article in the Register, China Blue High-Definition Disc (CBHD) manufacturers have to pay a royalty of 55 yuan (about $8.10) to make a CBHD player, "which beats Sony's Blu-Ray fee"[27] Very interestingly, the Audio Video Standard (AVS) licence agreement stipulates that the cost of licensing for those companies manufacturing in China should be lower than that for companies manufacturing elsewhere.

The price difference between legal mobile phones and those sold on the black market could range from 400–500 CNY (approximately US$48–60) to higher than 1,000 RMB (approximately US$120) (Zhao and Wu 2005).

IPR impedes the participation of domestic player in global markets

There is a grave imbalance that is only worsening between the royalties that are paid by Chinese companies and that which is earned by them. In 2005, Chinese companies earned US$157 million in royalty payments while spending more than $5.3 billion.[28] In 2008, while the figure earned had increased to US$570 million, the amount paid had

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[24]Tomoo Marukawa, *Chinese Innovations in Mobile Telecommunications: Third Generation vs. "Guerrilla Handsets"* 5, available at http://www.iss.u-tokyo.ac.jp/~marukawa/Marukawa_Draft1.pdf

[25]Fran Wang, 'Chinese firms to dump DVD standard: Report' (November 29, 2006), available at http://www.smh.com.au/news/home-theatre/china-to-phase-out-dvd-players-report/2006/11/29/1164777686817.html

[26]Zou Ayuang, *How Should China Deal with the Patent-Related Issues in Technical Standardization* 25, Masters Thesis submitted to Faculty of Law, National University of Singapore (2009), available at https://scholarbank.nus.edu.sg/bitstream/handle/10635/17662/ZouAY.pdf

[27]Austin Modine, *China Readies Blu-Ray Competitor*, 2008, http://www.theregister.co.uk/2008/07/29/china_cbhd_ready/

[28]World Bank, *Royalty and license fees, receipts (BoP, current US$)*, available at http://data.worldbank.org/indicator/BX.GSR.ROYL.CD

increased even more to US$10.3 billion.[29]

Every DVD player manufactured in China needs to utilize a number of patents because they have been declared as essential patents as per the specification of the DVD standard, and the majority of those patents are held by two consortia called DVD6C and DVD3C. While Chinese DVD player manufacturers were aware of the patents in DVD standards, they did not bother with such payments, at least till 2002.[30] Ayuang notes that, "[i]nterestingly, the foreign patent holders (6C and 3C) in the meantime were also aware that their patents had been used by Chinese producers without paying royalties. They chose not to take any actions against the infringements. Several years later, it was not until the Chinese DVD manufacturing industry had developed sophisticated enough and DVD players made in China began to gain a large international market share that DVD6C and DVD3C jumped in front of the stage starting to allege their patent rights."[31] The number of DVD producers in China sharply decreased after patent royalties were charged, with around 30 DVD player manufacturers shutting shop in just Shenzhen's Baoan district within five months of the levy of these royalties.[32]

Governments have used standard policies to build domestic IP and to also reduce outgoing royalties

Time and again, the Chinese government has pushed for reduced dependency on foreign technologies, to reduce their outgoing royalties, and try to earn royalties themselves. There are a number of instances of this, including the TD-SCDMA mobile telephony standard, the EVD and CBHD video disc formats, as well as the WAPI encryption standard for WLAN.

The Chinese government has pushed for the adoption of a new mobile telephony standard called TD-SCDMA. The government subsidised, to a tune of 20 million yuan, the development of SCMDA technology by Xinwei.[33] Dan Breznitz & Michael Murphree note that by "passing mandatory standards in consumer and other technologies will raise China's level of technology, prevent royalty fees payment to foreigners, and increase China's ability to force technology sharing and transfer from foreign partners."[34] Despite all this, Qualcomm has still argued that TD-SCDMA violates a large number of its patents, and this has even been an issue at talks at the World Trade

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[29] *Ibid.*

[30] Ayuang, s*upra* note 26, at 24.

[31] *Id.*

[32] Ayuang, *supra* note 26, at 25.

[33] Murakawa, s*upra* note 24, at 7.

[34] Breznitz and Murphree, s*upra* note 23, at 11.

Organization level.[35]

Due to high outgoing royalties and the desire to have an indigenous optical disc format, the Chinese government backed the creation of a new video disc format called the Enhanced Video Disc to compete with the DVD format. EVD, work on which started in 1999 with funding from China's State Trade and Economic Commission and the Ministry of Industry and Information Technology, utilizes VP5 and VP6 video codecs made by On2 instead of the MPEG video codecs used by the DVD standard. The EVD format was set to be adopted by many Chinese manufacturers, with the release of 54 prototypes in 2006.[36] However, since then, there has been almost no uptake of the format.[37]

China Blue High-definition Disc (CBHD) is an alternative standard to Blu-Ray backed by the Chinese government to reduce outgoing royalties. CBHD, which was developed by Tsinghua University, uses a video codec known as Audio Video Standard (AVS). Around 90 per cent of the patents on this standard are owned by Chinese companies.[38] According to a 2009 story, CBHD was outselling Blu-Ray discs by three to one in China. (Ari Allyn-Feuer,).[39] Warner Bros., Universal, Paramount, Celestial, BBC/Discovery, are all amongst major video producers who have adopted the CBHD standard.

The AVS patent pool guidelines set up two separate rates of royalties—one for licensing within China, and another for licensing outside of it. The guideline specifies that in principle the royalty for China-based companies should be CNY 1 per unit. For companies located outside of China, the royalties “should be determined by related parties in accordance with the Competitive License Fee Principle”.

In 2004, China also tried to go its own way on WLAN encryption as well, requiring that Intel, Broadcom, Atheros, and other wireless chip manufacturers support the China-backed WAPI encryption standard (and do so through co-production agreements with one of 24 authorised Chinese firms, which include companies like Legend Group, Huawei Technologies and China IWNCOMM), or face a sales ban.[40] Eventually, China backed down, agreeing to indefinitely postpone the implementation of the policy upon the intervention of the United States’ Secretary of State. Still, companies such as

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[35] Andrew Orlowski, China to Qualcomm: Er, You and Whose Army?, The Register, at http://www.theregister.co.uk/2006/02/15/china_3g_royalties/

[36] http://en.wikipedia.org/wiki/Enhanced_Versatile_Disc

[37] Ibid.

[38] http://forum.doom9.org/showthread.php?p=844950#post844950

[39] http://arstechnica.com/business/news/2009/08/homegrown-cbhd-discs-outsell-blu-ray-by-3-1-margin-in-china.ars

[40] http://www.theregister.co.uk/2004/03/12/china_tells_intel_to_calm/ and Fiona Chou, “China’s WAPI Evokes Foreign Protest” Telecom Asia (March 2004).

Apple have faced trouble with products like the iPhone which was forced to be sold without WLAN in China until it started supporting WAPI.[41] Importantly, the patents over WAPI technology are held by Chinese companies, and the licensing regime is not uniform. Chinese officials however countered this allegation by stating that "the fee is 'reasonable' and 'lower than that charged by Qualcomm for CDMA patent rights.'"[42]

Government intervention and competing patents have led to a drop in price

The rates of DVD patent licensing dropped significantly in response to the Chinese government announcing the adoption of the EVD standard. "In an attempt to woo China back into the fold, the group of manufacturers responsible for setting royalties on DVD discs and equipment has slashed the rates that licensees must pay."[43] One of the two DVD licensing groups, DVD6C, cut the royalty rate for DVD players and drives by 25 per cent—from US$4 to US$3—and the per disc rate by 10 per cent, from 5 cents to 4.5 cents, around the time that the adoption of the EVD standard was to be announced.

Software

The literature survey for software had to rely much more on mass-media reports rather than academic literature, as there was a dearth of academic interest in questions related to patents and copyright in the software domain. The only exceptions are a few legal articles on software patents in India, which all deal with the question at the level of legal abstraction, without empirical focus of the software industry, and without dealing with questions of access to knowledge.

Unlike their counterparts from the North, software producers from the south don't own the IP they produce and are consequently reduced cheap labour.

The primary business model for large Indian software companies like Infosys and Tata Consultancy Services, and thousands of small and medium enterprises, is providing software as a service (the SAAS model). Service contracts signed within this industry ensure that all IPR, i.e. trademarks, trade secrets, copyrights and patents developed during a project is owned by the client.

In stark contrast to American companies like IBM, which has applied for 5,896 US patents, not a single Indian company figures in the list of top patent applicants in

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[41] http://www.iclarified.com/entry/index.php?enid=9238

[42] Fiona Chou, 'China's WAPI Evokes Foreign Protest', *Telecom Asia* (March 2004).

[43] Andrew Orlowski, 'China Sends DVD Royalties South', *The Register*, (March 1, 2005), available at http://www.theregister.co.uk/2005/03/01/dvd_royalty_rates_cut/

the US.[44] The accumulation of software patents by foreign companies—primarily in the US—makes it difficult for Indian companies to move away from the SAAS model to developing products because of the increased risk of litigation.[45] Despite their numbers, Indian developers have not been able to build a globally-pervasive consumer software.

Software producers for pervasive technologies are growing in number, but they are being reduced to providers of cheap labour because of their non-existent IP portfolios.

According to a recent report in the Economic Times, there are 11,000 mobile app developers in India. However, most of the products they have developed are sold in international app markets either under their foreign clients' names or as 'white label' products.[46]

According to Nikhil Pahwa of Medianama.com (a leading Indian telecom/media research and analysis portal), most software developers for pervasive technologies don't own significant patent portfolios, but bigger players like OnMobile (incubated by Infosys) are aggressively doing so.[47]

International players are registering a multitude of software patents around pervasive technologies.

An area like mobile banking - an area with huge potential for growth in India that can be used for financial inclusion - may be harmed by the large number of patents that have been filed around the technology to enable it,[48] including in India.[49] A large number of patents around any one area would create a patent thicket making it difficult for a new entrant to innovate without conducting extensive legal due diligence, and even then exposing it to considerable legal risks.

Copyright and patent laws have prevented developers of pervasive technology software from scaling their products and services.

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[44]IFI CLAIMS, *IFI CLAIMS Announces Top Global Companies Ranked By 2010 U.S. Patents*, available at http://www.ificlaims.com/news/top-patents.html.

[45]Eben Moglen, founder of the Software Freedom Law Center, in conversation with authors.

[46]http://www.economictimes.indiatimes.com/features/sunday-et/business/indian-apps-makers-raking-the-moolah-globally/articleshow/7245023.cms

[47]http://www.slideshare.net/mobikwik/mobile-applications-in-india-future-bright-or-bleak

[48]"Mobile Financial Patent Wars Brewing?", http://www.fiercefinanceit.com/node/2159/print

[49]According to Big Patents, a patent search tool, in India there are more than 484 granted patents mentioning mobile banking with 5688 more pending: http://india.bigpatents.org/search/results?q=%22mobile+banking%22

In the Khalid Sheikh case, Apple banned Mr. Sheikh's account after he ignored copyright-related notices from Apple. While barring him, Apple stated that "Apple has informed you of numerous third party intellectual property complaints concerning over 100 of your Applications and reminded you of your obligations to obtain the necessary rights prior to submission of your Applications. Nevertheless, we continue to receive the same or similar types of complaints regarding your Applications despite our repeated notices to you." As a result 943 apps were deleted from the Apple App Store, even though not all of his applications were of a questionable legal character.[50]

The Aggarwala brothers from Kolkata, India, had developed a Facebook app called Scrabulous which was based on a board game trademarked by Hasbro in the United States and Canada and by Mattel in the rest of the world. At the height of its popularity, it was the 9th most popular application on Facebook, and boasted over 2.3 million active users with over 500,000 of them active daily.[51] In mid-2008 Hasbro filed a case against the Aggarwala brothers in New York, whilst Mattel filed a case in the Delhi High Court. The Delhi High Court rejected the argument of copyright infrigement, while holding that till the final disposal of the suit the Aggarwala brothers were restrained from using the name "Scrabulous" or any other makr deceptively or confusingly similar to Scrabble. Since then, the Aggarwala brothers have changed the name of the app (to Wordscraper) and the name of their website to Lexulous.com. Consequently, Hasbro withdrew the case that was filed in New York.

Another instance is that of PlayFair and Apple's FairPlay DRM system. While India has not signed the WIPO Copyright Treaty (WCT), and does not have any anti-circumvention laws, Apple still managed to get Indian free and open source software (FLOSS) developers to stop development of a DRM-stripping program. Since Apple iTunes is not available for GNU/Linux, people who have bought music off the Apple iStore could not access that music in GNU/Linux. Thus, some FLOSS developers in India decided to carry forward a project called PlayFair that involved removing FairPlay protection so that it could be played in GNU/Linux. While this should qualify as fair dealing for interoperability under s.52 of the Indian Copyright Act, Apple still got its lawyers to send a cease-and-desist notice, claiming that development of PlayFair was a violation of the Copyright Act and the Information Technology Act (without specifying precise sections, or how that was so). Since the company that was providing the hosting could not muster up funds to consult a lawyer and fight the case in court (though they were convinced that what they were doing was not a violation of any Indian law), they had to take PlayFair down.

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[50] Gagan Biyani, *Apple Bans App Store's 3rd-Most Prolific Developer*, Aug 3, 2009, available at http://www.mobilecrunch.com/2009/08/03/apple-bans-app-stores-3rd-most-prolific-developer/

[51] http://www.techdirt.com/articles/20080111/152626.shtml

Amit Jaipuria, the founder of Bangalore-based GizaPage, filed for a patent in India and the USA in 2001. In 2006, the US Patent Office (USPTO), granted Patent 7047202 in May 2006 titled “Method and apparatus for optimizing networking potential using a secured system for an online community.” The date of filing precedes the existence of social networking websites like Facebook, LinkedIn.com, Friendster, Myspace and Orkut. Amit unsuccessfully tried to first auction the patent and then subsequently tried to negotiate licenses from all the major social networks. These negotiations also failed because they were interrupted by a patent challenge based on the existence of prior art. The USPTO narrowed the claims but upheld the patent. Since the remainder claims still cover key social networking features, anonymous sources from the industry say that Amit has been approached by patent trolls in the USA who want to use his IPR to extract royalties from successful social networking websites.

Content

Search engines, web hosts, and other intermediaries are often sued for aiding unauthorized access to copyrighted materials.

In 2005, American and European music studios filed a case against Baidu, the most popular search engine in China, for deep-linking to music files. The International Federation of Phonographic Industry (IFPI) lost that case, and subsequently lost it again on appeal. In 2007, IFPI succeeded against Yahoo! China, which was found guilty of being a knowing intermediary for the transfer of copyright-violating music. But that case did not prove to be a useful precedent, as IFPI filed another case against Baidu, and lost it, in 2010.

In 2008, Super Cassette Industries (owner of the Indian music brand T-series), an Indian media corporation which has a catalogue of over 35,000 albums and about 30,000 film and video clips, sued YouTube, Yahoo, MSN, MySpace, Guruji.com and Bharatstudent.com for copyright infringement.[52] Guruji.com which is an indigenous search-engine, was accused by Super Cassette Industries of providing meta-data and deep-links for direct-download to mp3 files on sites like Songs.pk, Musicplug.in, Pz10.com, Bollymobile.in. Some industry observers published evidence of alleged collusion[53] between Guruji.com and Songs.pk. Songs.pk, is an pseudonymously maintained site that provides unauthorized access to copyrighted music, including

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[52] http://economictimes.indiatimes.com/News/News_By_Industry/T-Series_notice_to_websites_for_copyright_violation/articleshow/3242429.cms

[53] See comments on http://www.medianama.com/2010/04/223-execs-of-sequoia-funded-guruji-com-arrested-over-copyright-violation-in-india/

Bollywood songs, Pakistani songs, “Indian pop and remix songs”, “bhangra songs”, and ghazals as free MP3 downloads, is amongst the most popular sites in India. In 2010, the CEO of Guruji and senior executives were briefly arrested and equipment was seized for investigation.[54]

The expansive nature of copyright law makes it easy for third parties to unwittingly violate it.

Singing users: There are a number of different instances of copyright-related problems affecting Indian content sites. One of the most frequently encountered problems is that of user-generated content hosted by mobile phone companies. All companies from Reliance[55] to Spice,[56] Airtel and Ibibo,[57] Vodafone, and Aircel have in one form or another allowed people to record audio content. In some cases, it is in the form of a singing contest conducted over mobile phones (Ibibo, Spice Digital, and in other cases, it has been user-recorded status updates (Aircel) and user-recorded ringtones (Reliance). Some technology-related blogs have pointed out that this obviously raises issues of copyright clearance related to the lyrics and the music, issues which have not been paid adequate attention by the companies (most of which seem to have transfer of copyright from the singers to them as a standard term in their terms of service). This has led T-Series to launch a case against Ibibo.

Developers and providers of “value added services” on pervasive technologies are unsure about their compliance with IP law.

According to Nikhil Pahwa of Medianama.com, at mobile technology and business conferences there is almost always discussion about entrepreneurs and small business in second- and third-tier Indian cities who have setup a sales network providing pirated content on mobile memory cards (MMCs). The focus at the moment is local, regional and international music. The scale is similar to DVD/CD pirates operating in cities, i.e. those players that serve the majority of the market.

Nikhil Pahwa also noted that there is significant unauthorized streaming of FM radio on the mobile phone. While doing so, many such streamers insert their own advertisements in place of the advertisements that the station broadcasts.

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[54] http://www.medianama.com/2010/04/223-execs-of-sequoia-funded-guruji-com-arrested-over-copyright-violation-in-india/

[55] Anupam Saxena and Nikhil Pahwa, Reliance Launches User Generated Caller Tune Service; Liability, http://www.medianama.com/2011/01/223-reliance-launches-user-generated-caller-tune-service-liability/

[56] Nikhil Pahwa, Spice Digital Partners Surtarang For Mobile Talent Hunt; Copyright, Entry Fee, http://www.medianama.com/2010/05/223-spice-digital-partners-surtarang-for-mobile-talent-hunt-copyright-entry-fee/

[57] Airtel launches the World’s First Audition on a Mobile phone for Indian Idol, http://airtelisinger.ibibo.com/

He additionally cited the instance of VUClip, a mobile video search and delivery start-up, that allows users with cheaper/ less sophisticated handsets to view videos from platforms such as YouTube and Metacafe. Apart from the search functionality, VUClip[58] also re-encodes the video into a format supported by the handset, splits longer videos into smaller clips which can be downloaded over slower and unreliable connectivity and also allows users to save videos onto their phones. VUClip has signed deals with many major telecom operators in India including Bharti Airtel, Idea Cellular, Vodafone, Aircel, and Tata Indicom. According to Mr. Pahwa, the compliance of VUClip with Indian copyright law is unclear. While VUClip is not an Indian company, it is important from the perspective of this knowledge survey because they have significant market share in India.

IPR conflicts are not only with proprietary content, but with freely-licensed content as well.

In 2006, Baidu was accused by Wikimedia Foundation of copying content wholesale from Wikipedia without fully complying with the requirements of the GNU Free Documentation Licence.[59] Similarly, in an e-mail conversation, Arthit Suriyawongkul, a Thai social anthropologist, cited the example of the PanyaThai project,[60] which is supported by the government of Thailand, used content from Wikipedia without proper attribution. Pratham Books, an Indian children's books publisher, also found that photos they had put online with a Creative Commons attribution licence had been used without attribution by a book publishing trade association.[61]

Reactions to alleged IPR violation by rights-holders have often been illegal

Rights-holders in India have also taken to legally questionable tactics to tackle piracy. While their attempts to subvert the legal system in tackling disc-based piracy is well documented,[62] there are also instances of them using possibly illegal tactics to take down digital piracy through denial of service attacks against torrent servers.[63]

Copyright violations help grow infrastructure market, and are often the only choice available. Sometimes, piracy is the only legal way to gain access to a large amount of content that just is not available in a particular medium through legitimate channels.

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[58] http://www.medianama.com/2009/09/223-mobile-video-co-vuclip-raises-6-million-series-b-round/

[59] http://abcnews.go.com/Technology/PCWorld/story?id=3451658

[60] http://www.panyathai.or.th

[61] http://blog.prathambooks.org/2010/10/little-attribution-goes-long-way.html

[62] Prashant Iyengar, BSA's Response on SpicyIP, http://originalfakes.wordpress.com/2009/04/04/bsas-response-on-spicy-ip-in-perspective/

[63] http://www.medianama.com/2010/09/223-bollywood-resorts-to-crime-to-fight-online-piracy/

Jinying Wang cites the example of VCD players in China around 1995. She notes that around 600,000 VCD players were available in the Chinese market, whereas the legal VCD market only released around 1.2 million individual VCDs—only about 2 VCDs per player. The only way to satisfy the demand from the market was through piracy, she argues.[64]

[64] Jinying Wang, Piracy, Circulation, and Control in Contemporary China, (unpublished, on record with CIS).

Project Methodology

Pervasive Technologies: Access to Knowledge in the Marketplace will use case-studies to investigate the intersection of a2k, intellectual property and pervasive technologies from China, India and other developing countries in Asia.

During the first 9 months, the team at the Centre for Internet and Society (CIS) along with selected research advisors from the region will produce a methodology guide that will situate the project and outline key considerations and tools to be employed during the course of research. (The methodology guide will be similar in scope and spirit to the methodology guide that helmed the ACA2K project[65]).

The purpose of a methodology guide in this instance is manifold; it will serve as a research guide to participants in the project and will also be of use to others wishing to study copyright and patent-related issues around pervasive technologies in other regions.

The methodology guide will contain four sections:

a) Project objectives and scope of work;
b) Fieldwork analysis and ethical considerations;
c) Legal analysis; and
d) Project deliverables.

The *first* section will contain details on what the research project aims to achieve, what its scope of study is and what the research questions are. This section will contain details on each of the project's sub-components. The *second* section will contain guidelines on how to conduct fieldwork as part of the study, and stress ethical considerations to be observed while conducting research, given the sensitivity of the subject. The *third* component will contain exhaustive legal analysis tools that specify what aspects of copyright and patent law the researchers will - at the minimum - have to take into consideration across the different countries in which they are working. Lastly, the *fourth* component will outline all project deliverables and the timeline by which these outputs will be produced. Included in the deliverables will be outcomes, not just outputs, which will come about as a result of an outcome mapping exercise that commences with the research, in order that boundary partners and key stakeholders are engaged with at all key points leading up to the research output.

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[65] See: http://www.aca2k.org/attachments/179_179_ACA2K%20Methodology%20Guide-with%20DTP-pdf.pdf

Layers of technology

Each case-study will primarily focus on one of the following layers of the technology:

1. Software
2. Hardware
3. Content

The phrase “primarily focus” has been used deliberately because for many pervasive technologies it is difficult to draw clear distinctions between the software and hardware layers or the content and software layers.

Life-cycle Stages

Each case-study will take into account specific stages in the overall life cycle and concentrate on a cluster of stages - or even just one stage - that is particularly relevant and noteworthy to the project:

1. During manufacturing: design, research and development, manufacturing and any other step taken before the product/service leaves the site of manufacture.
2. Sale and use in country: sale, resale, repair, refurbishment and domestic consumption.
3. Sale and use in foreign countries: sale, resale, repair, refurbishment and regional or international consumption.

Legal Analysis

Once the layer and the life-cycle stage/s for a particular pervasive technology have been identified, researchers will perform an indicative audit of all the copyright, patents and standards[66] implicated. Once this is done, researchers will then subject the practice of the producers, retailer or users to all appropriate legal tests, at least including those contained in the following list:

1. Proposed and existing laws and policies in country of origin, country of consumption.
2. Case law in country of origin, country of consumption, and WTO decisions.

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[66] Brad Biddle, et al., *How Many Standards in a Laptop? (And Other Empirical Questions)* (September 10, 2010). Available at SSRN: http://ssrn.com/abstract=1619440

3. Proposed and existing regional and bilateral Free Trade Agreement [FTAs]
4. Proposed multilateral, plurilateral agreements like the WIPO Broadcast Treaty, the Anti-counterfeiting Trade Agreement.
5. Proposed and existing laws and policies that impact patent and copyright-related developments, such as industrial policies and Bayh-Dole type legislation.

Not all of these sources of law need necessarily be implicated in every case. However, the application of the above tests would, for instance, indicate whether a patent (or a group of patents claimed as essential for a standard) can be:

- registered at all as per local law;
- in fact registered; or
- whether they come within any sort of limitation or exception:
- under existing provisions of patent law pertaining to compulsory licensing, or
- under a specific bilateral agreement
- under an industrial policy

Ethnographic Analysis

1. Documentation of how knowledge is identified, procured, archived, used, protected, and shared within a factory, at the level of an industrial hub, as well as at a national and super-national level, through anonymous and attributed interviews with those within the industry and those who study it.
2. Documentation by constructing social network maps[67] of the entrepreneurs, organizations, and the support ecosystem—integrated circuit manufacturer, antenna manufacturer, assembler, importer, brander, seller, refurbisher, governmental policy-setters,—and places through which materials and knowledge flow. This will help map the existing knowledge asymmetries, how they are overcome and/or reinforced, and the varying roles that these differing entities play.
3. As part of both the earlier documentations, CIS will note what role the various actors' understandings of IP and industrial policy play, and how this contrasts both with the governmental IP policy as well as international IP politics.

Ethical Considerations: Data Collection and Reporting

[67] Solomon J. Benjamin, Neighbourhood as Factory: The Influence of Land Development and Civic Politics on an Industrial Cluster in Delhi, India (1996), unpublished PhD dissertation submitted to the Department of Urban Studies , Massachusetts Institute of Technology.

Before each interview, researchers will ensure that information is being obtained with the informed consent of the interviewee, and records will be kept of such consent. In seeking the informed consent of the interviewee, the researcher should at least explain the purpose of the research and the people and institutions behind the research. Given the ambiguous legalities that this research project deals with, anonymity and confidentiality will be be offered not only to the individuals interviewed, but also to the organizations they are associated with and mentioned. Unless the offer is waived, confidentiality will be strictly maintained within the research team, with the consent records being suitably modified. All of the contracts entered into by CIS will contain clauses regarding these ethical considerations. Furthermore, during the reporting of the study, CIS will pay special attention to reporting of how these ethical standards were maintained.

Gender

Gender inequities (and particularities) are of importance to the research project, and as such, will be a standard operating part of the research process. Previous experience with finding connections between copyright and gender have produced mixed results. One example that comes to mind is the ACA2K[68] project, wherein, the general reported findings were that direct connections between copyright and gender were thin.

Within the ambit of this project, we envisage a wider gender scope; beginning with pervasive technologies, moving into a2k, and finally ending up in intellectual property. For more general a2k research studies, the gender connections that stretch beyond the narrow remit of a2k would invariably involve education and learning - and in both these areas, with respect to gender, there is a large and robust body of work that has been developed over the decades.

The reason that we may begin with the intersection of pervasive technologies and gender in this instance is because there is very little scholarly or research work in the area at all. Beginning here, all researchers will be exhorted to probe connections further, depending on the precise object of study. The starting point will be existing literature on gender and ICTs (which references a much wider scope of technologies): for example, David Gilbert et al., *Technophobia, Gender Influences and Consumer Decision-Making for Rechnology-Related Products*[69], or *The Gender-Technology Relation: Contemporary Theory and Research*[70] Tasuku Igarashi et al., and *Gender Differences in Social Network Development via Mobile Phone Text Messages: A*

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[68] See: www.aca2k.org

[69] 6 European Journal of Innovation Management 253 (2003).

[70] The Gender-Technology Relation: Contemporary Theory and Research (Keith Grint & Rosalind Gill, eds.) (1995).

Longitudinal Study,[71] among others. The end point - in instances where this is feasible and practicable - will be the further intersection of gender with pervasive technologies *and* intellectual property.

Pervasive Technologies, a2k and Intellectual Property: The Legal Matrix

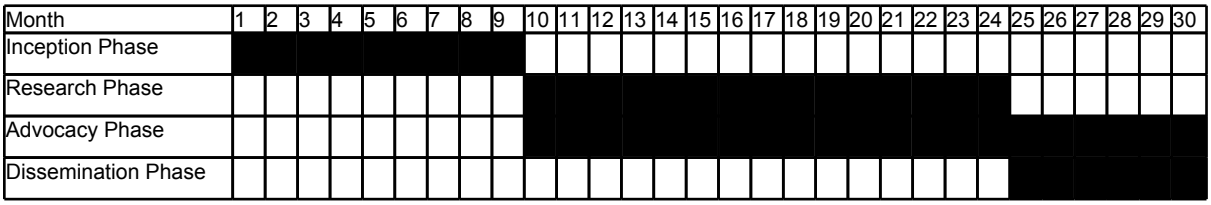
	Regional FTAs EU FTA USA FTA	Japan FTA ACTA Customs Policies	
Pervasive Technologies During Manufacturing Sale and use in country Sale and use in foreign countries Hardware Software Content			
Origin Copyright Law Patent Law Standards Policies	Destination Copyright Law Patent Law Standards Policies	International Copyright Law Patent Law Standards Policies	EU/USA Copyright Law Patent Law Standards Policies

[71] 22 Journal of Social and Personal Relationships 691 (2005).

Modality

Timeline

We expect the project to run across two and a half calendar years or 30 calendar months, split across 4 phases as per the following diagram. The advocacy phase will overlap with both the research phase and the dissemination phase.



Inception Phase

The project, based out of CIS in Bangalore, India, will be primarily administered by a research committee consisting of four or five senior researchers from across India, China and other parts of Asia. This committee, constituted before the inception phase, will consist of researchers with an expertise in intellectual property and professional connections to, or experience in, Asia.

At the outset of the project, the research committee will convene in either India or China, probably the latter, to discuss prospects, potential research connections and important subjects to look for as research studies. Additional invitees to this initial meeting will include select steering members from like-minded projects in Africa and Latin America.

Thereafter, the committee will establish ties with individual researchers for each research study. The identification and project development process will rely on a mix of open calls and invited proposals, eventually identifying a total of:

(a) 6 research proposals, 3 each across India and China, that deal with a very specific pervasive technology that qualifies for a study within the broad framework of the project and
(b) 4 research proposals from 4 Asian countries, chosen with differences in geography, economics and demography to be representative of the region at large.

Research study proposals will be invited keeping in mind the research problem and structure outlined in this project proposal. Details of shortlisted studies will be made publicly available as soon as they have been finalized.

India-China research will be directed to a greater degree toward hardware and software, given the established nature of these sectors in these countries. At this point, we believe that the research in other Asian countries will focus to a greater degree on content, both around pervasive technologies and online platforms that serve a large number of users. In each case, researchers will be asked to identify opportunities for investigation, highlighting the policy situations in each country, and addressing the relevance of the research problem in each geography.

Once all the 10 researchers have been identified, the research committee will work with each researcher to develop a detailed proposal, as well as help with the methodology. Researchers will have considerable flexibility, both within the India-China research and the broader Asian country research, to design the research study as best reflects their individual interest. In all cases, researchers will have flexible budgets to work with, in order to account for their time, as well as travel and research costs that they envisage. These detailed proposals will be completed and finalised within the last 3 months of the inception phase.

Concurrently, the research committee will, in consultation with the identified researchers, produce a methodology guide that will, amongst other things, contain concrete research protocols that meet with best-practice guidelines, especially when qualitative fieldwork is to be employed and legal analysis is to be applied.

The detailed research proposals and methodology guide will be subjected to both peer and public review. They will distributed for comments to selected external experts, research networks and topical public mailing lists.

Research Phase

The research phase will last for 15 months starting on the 10th month and ending on the 24th month. The exact schedule for each study will be decided by the research committee based on the methodology guide and the schedule that each selected researcher has worked out. In general, the researcher will interact with the research committee to work on a research plan as established, where she/he will:

1. Report, collect data, examine secondary scholarship, following ethical guidelines for fieldwork and qualitative research
2. Follow a timeline that is agreed upon
3. Work towards research outputs being received in comprehensive first-draft form within 9 months from the outset of the research project
4. Identify support required from the research committee

5. Utilise the research committee for advice, run regular reporting/feedback sessions
6. Interact with other researchers from within Asia and beyond to engage with other, similar research happening in South Africa and/or South America
7. Engage in advocacy after identifying boundary partners from the outset of the research

The researchers will have the opportunity to meet each other face to face around the middle of their 15 month research phase along with the research committee.

During the research phase we expect researchers to provide short public updates on their work, which will primarily disseminated through a project website maintained on the CIS institutional website. During the course of providing updates, researchers will be expected to link to as many supplementary documents / research as possible, including (and especially) material that may not be ordinarily available online and/or in a language accessible to many. The project will assist in translation as much as necessary, both in terms of regular postings and updates to the website, as well in terms of supplementary material researched.

Advocacy Phase

During the advocacy phase CIS will make a list of all national and local laws and policies on copyright, patents, standards policies and governmental electronic interoperability policies, other industrial policies that affect choice of patented standards, bilateral agreements like free trade agreements, which often contain clauses on intellectual property rights, as well as international discussions and negotiations (such as those that happen at the World Intellectual Property Organization's Standing Committee on Patents and the Standing Committee on Copyright and Related Rights (WIPO/SCCR) that could affect the intellectual property regimes surrounding pervasive technologies.

The mode of engagement in each country and with each of these laws and policies will be dependent on where in the lifecycle of the policy process each is. If there is a lack of policy initiatives, then the mode of engagement will be proactive. If some policy initiatives already exist, then reactive engagement will be preferred instead of trying to create new policy discussions.

As it is always preferable to bring about change from the grassroots, rather than impose it in a top-down fashion, the earlier it is in the policy life-cycle, the better it would be to focus on boundary partners that are at a greater distance from the policy-

making sphere: civil society actors, individual entrepreneurs, industry associations, etc. However, if a policy is at a more mature stage, then building consensus by targeting such groups would be difficult, and thus the focus would be on policymakers such as bureaucrats, politicians, and treaty negotiators.

Unlike many other research networks—such as PANL10N, PANACeA, and PANdora—the network created by this project will not be one of peers, but rather one of mentorship and support. The role that CIS envisages for itself is one of providing intellectual support and operational infrastructure to individual researchers and groups. We chose not to establish a network of peers, since such a network is only feasible when the different nodes in the network have mutually reciprocal needs and resources, and when there is a sufficiently large number of researchers to establish a critical mass in the research network.

However, one-to-one support from the research committee to the individual researchers, will be inefficient and laborious. Individual researchers will be grouped into ad-hoc teams based on commonalities of either policy opportunities or research interests. These ad-hoc teams will be both form and be disbanded as and when their function is needed and served. A single researcher may simultaneously belong to multiple teams. For instance, a researcher in Thailand might be part of the group looking at developments on the SCCR in Geneva, as well as a regional group on enforcement of norms for IPR infringement, or even part of an industry engagement effort in Asia.

Additionally, the Open Society Institute (OSI) has expressed interest in supporting the advocacy phase of this project. Their support, for which we will be shortly applying separately, will help in enabling the participation of the researchers at the meetings organized by WIPO. This would allow them to:

a) gain a deeper understanding of international IP policy formulation process;
b) gain the confidence of and establish a working relationship with their respective country negotiators, and other like-minded stakeholders; and
c) spread their research findings and recommendations during the meetings, in the form of floor interventions, as well as through corridor networking.

Dissemination Phase

The public engagement and research dissemination phase of the project will consist of reviewing the research collected, adding comparative layers to the work done, publishing it, and allowing for individual and collective engagement on the part of the researchers with policy-makers and the general public. This phase is designed to last 6

months.

The first month of the public engagement phase will be devoted to reviewing research collected (and will overlap with the research phase to the extent that is possible). The second month in this phase will be devoted to adding comparative layers to the research produced (precisely, a summary of the collected work, an introductory essay which describes the scope of the project and its objectives, and a concluding chapter which provides an overview of lessons learnt across the scope of all the research conducted (i.e., India-China-Asia).

The last 3 months of the public engagement phase will be devoted to professional copy-editing, translation (at the moment envisaged as English to Mandarin or vice versa), and finally, publication in English and Mandarin in both India and China, with select distribution to the other Asian countries involved. While 3 months is an ambitious target for copy-editing, translation and publication, we believe that it is better to limit the phase - in order not to build in delays - and extend the project timeframe, if necessary (and not the costs) to hold public engagement seminars only once the book publication is ready. Alternatively, should it seem that the book publication requires a lead time that does not justify waiting for, then public engagement can begin on the basis of research outputs as they are, published (in the interim) by the research committee.

The change process phase will build on an outcome mapping exercise - of identifying boundary partners and change agents - that is established early on in the research phase. All researchers will be encouraged to seek out the most creative possibilities for engagement of stakeholders (including the public at large) in terms of disseminating findings and influencing policy change.