Transparency and Development: Ethical Consumption and Economic Development through Web 2.0 and the Internet of Things

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Abstract

The increasingly complex commodity chains of contemporary capitalism conceal the histories and geographies of most commodities from consumers. Over the past decades, the production of commodities has been globalised at a staggering pace, and yet our knowledge about the production of those same commodities has shrunk. At the same time, a number of commentators are now pointing to the potentials for a different type of globalisation, one of knowledge and transparency that will harness the power of the Internet in order to allow consumers to learn more about the commodities that they buy. This paper discusses the potentials for emergent Web2.0 technologies to transcend barriers of time and space in order to both facilitate flows of information about the chains of commodities and open up new potential politics of consumer activism. It explores the potentials of web based cloud collaboration and the machine mapping of object information onto the Internet ("the Internet of Things") to allow for ubiquitous access to information. Cloud collaboration appears to greatly enhance the transparency of information by reducing a reliance on infomediaries. However, these hopes are ultimately tempered by a number of persistent barriers to the creation and transmission of information about commodities, discussed in the final section of this paper.

1. Introduction

A central paradox of contemporary processes of economic globalisation is that information about commodities has not been globalised at the same rate as commodities themselves. Contemporary capitalism conceals the histories and geographies of most commodities from consumers who rarely have opportunities to gaze backwards through the chains of production in order to gain knowledge about the sites of production, transformation and distribution. It was pointed out as early as Marx that the "enigmatic character" of the social relations underlying commodities is a characteristic of capitalism. Yet the contemporary complexity of commodity chains means that production processes are more opaque than ever. And with increasing complexity, the social relations, environmental conditions and product composition are more difficult to access and map, and "made in" labels have virtually lost their meaning.

Increasingly complex structures of production are driven by transnational corporations (TNCs) in their quest for efficiency, new markets and new competitive advantages (Dunning, 1993). TNCs generally break production processes into networks and chains that are constituted by complex sets of geographically separated nodes (see for example Gereffi, 2005). Developing countries have sought TNC investment in order to access capital, technology and knowledge that TNCs are seen to possess, and capital liberalisation has encouraged plant relocation, outsourcing and mergers and acquisitions across the globe. As a reflection of the increasing extension and density of commodity chains organised by TNCs, world Foreign Direct Investment (FDI) inward stock increased eight-fold between 1990 and 2007 (UNCTAD, 2008, p. 257).

The decoupling of commodities from available information about those same commodities has led to increasing demands for greater transparency in production processes.

Many of these demands can be seen in the context of "anti-globalisation" criticisms against overseas corporate practices, and as a battle of information about what goes on in the factories and maquiladoras of the Global South. Campaigns around fair trade and corporate social responsibility have convinced large numbers of consumers that their purchasing practices do have global repercussions TNCs, in turn, have often responded by constructing detailed narratives of product histories to ensure consumers of their magnanimity. The Starbucks corporate website, for example, contains a mapping tool that allows customers to follow the chains of Starbucks coffee and explore virtual representations of the sites of production (see figure 1). Clicking on any node brings up images and videos, as well as information highlighting any positive aspects that Starbucks want consumers to know about their involvement with distant communities (see figure 2). There are examples of this branding being contested. For example, despite a heavily publicised campaign by Marks & Spencer to highlight its environmental credentials, a number of newspaper articles have highlighted the fact that the company actually lags behind many of its competitors (c.f. Hickman, 2007).

Figure 1: Commodity Chain Mapping on Starbucks.com

Figure 2: The Highlighting of the Positive Effects of Consumption on Starbucks.com

NGOs and other organisations have made use of the Internet to spread information and campaigns aimed at the social and environmental effects of corporate practices. It has been suggested that the Internet provides an infrastructure for "internetworked social movements" and an alternative public sphere, through which information about corporate practice can be exchanged and strategised over (Langman, 2005). Yet for the most part, the fact that information is transmitted through producers and branders means that narratives constructed about upstream nodes in commodity chains can be difficult to challenge. At the same time, a number of commentators are now pointing to the potentials for a different type of globalisation: a globalisation of knowledge and transparency that will harness the power of the Internet in order to allow consumers to learn more about the commodities that they buy.

This paper discusses the potentials for emergent Web 2.0 technologies to transcend barriers of time and space in order to facilitate flows of information about the chains of

commodities and thereby encourage consumers to make informed economic decisions and be more aware of their economic, social, political and environmental impacts. Wikis, and what has been dubbed the 'Internet of Things,' have opened up new possibilities for both mapping commodity chains in cyberspace and integrating 'guerrilla cartography' with the politics of production and consumption. This globalisation of knowledge and transparency therefore offers the potential to alter the politics of consumption and practices of production, and ultimately empower marginal individuals and communities. However, these hopes are tempered by a number of persistent barriers to the creation and transmission of information about commodities that will be discussed in the final section of this paper.

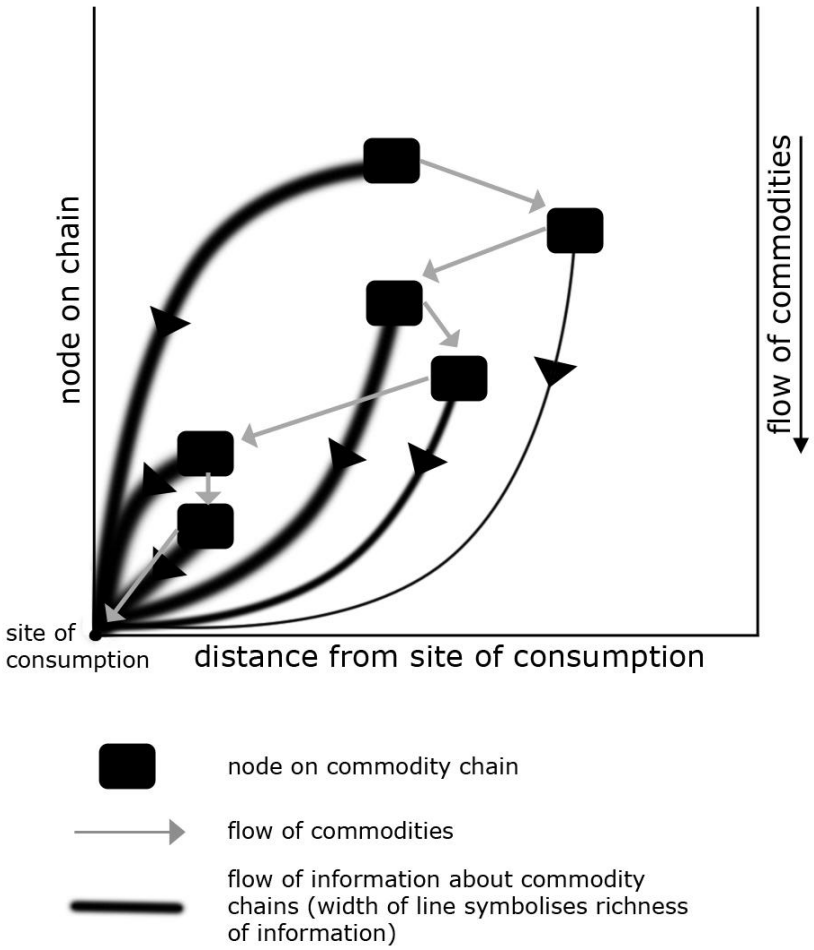
2. Mediated Flows of Information

"Campaigners have peeled away the facade to see how the goods are produced...This is very uncomfortable for these companies, because even though they are the engines of globalisation, they don't really believe in globalisation, not this kind of globalisation. Their whole system depends on the world of production and the world of consumption staying safely apart, and there not being this connection at the grassroots where we learn the secrets behind our shiny secret airbrushed global world" – Naomi Klein in No Logo (Jhally, 2003) .

Transparency and flows of information in commodity chains have a long-standing link to distance and proximity. Geographers and other social scientists have argued that these relationships are centrally important in understanding the distribution and transmission of knowledge (Eldridge & Jones, 1991; Feldman, 1994; Jafe, Trajtenberg, & Henderson, 1993), and that transmission costs and boundaries impede the flow information (Audretsch & Feldman, 1996; Krugman, 1991). Traditionally, consumers have generally possessed more knowledge about nodes on commodity chains that are close to them in absolute distance than

nodes that are further away.[1] For instance, in the commodity chains of bread sold in Manchester in the eighteenth century, most consumers would be more likely to have knowledge (related to characteristics such as production practices, ownership or labor issues) about the bakeries in their neighbourhood than the wheat farms in Southern England, Sweden, or Poland (Hopkins & Wallerstein, 1994). The flow of information is thus highly constrained by distance (see figure 3).

Figure 3: Simplified Representation of Flows of Information about Nodes on a Commodity[2] *Chain*



[1] This is not to imply that there is any necessary correlation between physical proximity to nodes on a commodity chain and topological proximity to positions of nodes on commodity chains.

[2] In this paper, we take a commodity to mean any good that results from a production process, meets perceived or actual needs, and has an exchange value (Clarke, 2003)

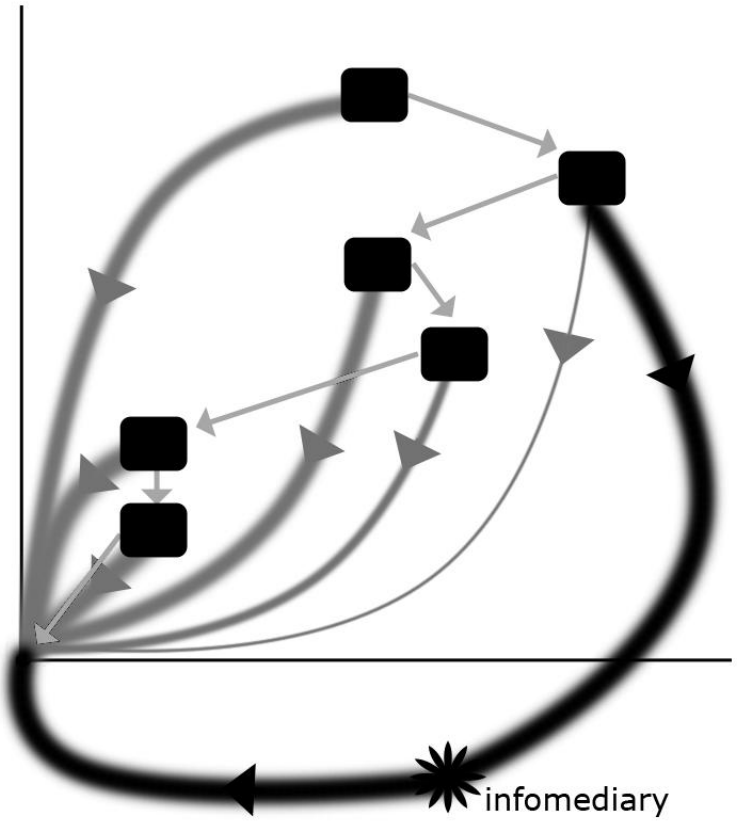
Mediators (e.g. in the form of newspapers, radio, television, or the Internet), however, have been able to alter the basic relationships between proximity and transparency. A variety of organisations have been able to develop reputations as trusted infomediaries for their critical analysis of the commodity chains of products. Consumer watchdog magazines such as Which? (in the UK), Consumer Reports (in the US), and Stiftung Warentest (in Germany) are targeted primarily at consumers in wealthy countries, and reveal information that producers typically seek to conceal. Myriad public interest groups also make it their mission to distribute information about the often hidden practices of many TNCs. Reports on Shell's environmental record in the Niger Delta, Mattel's use of child labourers in Sumatra, and Nike's sweatshops in Vietnam, are just a few of many examples of this sort of investigative interest in the origins of goods and commodities (Klein, 2002).

Consumer knowledge about distant nodes can have powerful effects on both the consumers and producers of commodities. Without any information transfer about the sites of production, bananas grown on St. Lucian plantations or shoes made in Vietnamese factories are certainly globalised products, but knowledge about those products remains highly localised. With media interventions, information about fair trade practices on banana plantations or child labour in shoe factories becomes as globalised as the bananas or shoes themselves, and can reshape how those commodities are consumed and ultimately produced. Indeed, there are myriad examples of the paradoxical media interventions in the flows of knowledge through commodity chains. For instance, through documentary reporting and feature stories of coffee growers in Kenya, many consumers in London have a detailed understanding of exploitative production practices on some farms in Central Kenya but continue to have little or no knowledge about how coffee is roasted in Europe.

Therefore, with the ever increasing importance of infomediaries, and their uses of communication technologies, the relationships between distance (either absolute or

topological) and the flows of information become less clear (see figure 4). In particular, the Internet is frequently thought to alter the link between proximity and transparency in several ways. First, the Internet strengthens what has been called the "spotlight effect" (Letnes, 2002), whereby NGOs, activists and journalists publicise information about unsavory corporate practices. Such stories are occasionally rebroadcast by mainstream media and can have costly and harmful effects on corporate reputations. Second, the Internet can assist with the spreading of campaigns that target general production practices, advocate legal changes or protest trade agreements. The Internet facilitates both coordination among activists within a network, and the outreach of these networks to potential supporters (Illia, 2003; Kavada, 2005; Keck & Sikkink, 1998). Finally, the Internet can function as an alternative public sphere where norms and strategies are communicated and debated.

Figure 4: Altered Flows of Information due to Media Interventions



The suitability of the Internet to globalising information has inspired a multitude of projects dedicated to mapping, visualising and communicating conditions at sites of production in the Global South to activists and consumers in the Global North. Welford (2002), for instance, sees the emergence of a "new wave of globalisation" where increased transparency aids the struggle for human rights. Similarly, it is frequently argued that communication technologies such as the Internet have unique capacities to create democratic and participatory spaces for information exchange and debates (Langman, 2005).

The most optimistic commentators tend to see the Internet as a new and alternative or sub-cultural public sphere that subverts the mainstream public sphere controlled by corporate conglomerates (Kahn & Kellner, 2004; Kellner, 1999; Lipschutz, 2005; Olesen, 2005). As an extension into cyberspace of Fraser's (1990) work on "subaltern counterpublics", the Internet is seen as a parallel discursive arena where members of various social groups invent and circulate counter-discourses against power. While conceding that there is a danger that computerisation of society might increase inequalities, Kellner (1999) argues that a "democratized and computerized public sphere" is necessary to revitalise capitalist democracies, and would provide opportunities to overcome structures of inequality. It has even been suggested that internet technology is making possible democratic models of socialist central planning (Cottrell & Cockshott, 2008).

The Internet and the public sphere it represents are seen as the backbone of a global civil society or a global social movement that has emerged in opposition to neoliberal globalisation. The Internet has enabled new kinds of communities to share common grievances and develop strategies to mobilise in accordance with them. What Langman (2005) terms "internetworked social movements", use electronic communication for recruitment, coordination, leadership and mobilisation. These movements have produced a universalising dynamic which is taking it beyond a mere series of isolated "militant

particularist" struggles (Ashman, 2004). They have therefore been of interest to geographers interested in movements that attempt to bridge socio-spatial differences and thereby alter the scalar dynamics of opposition to globalisation (Castree, Featherstone, & Herod, 2008; Haarstad, 2007; Harvey, 2000). While transnational solidarities are obviously not new, the present alliances are distinct with regard to the means, speed and intensity of communication between the various groups involved (Routledge, 2000). As these writings make clear, Internet-aided political movements are changing spatio-political practices and the ways in which we conceptualise them.

Transnational advocacy networks composed of non-governmental organisations (NGOs) have perhaps become the most effective infomediary in politics of consumption, collecting information, bringing it to consumers, and pressuring governments and public agencies (Keck & Sikkink, 1998). Yet, as a survey by Kavalda (2005) shows, established NGOs used their websites primarily as an extension of their offline work, rather than as a new medium in its own right. For these organisations the Internet seems to only facilitate and speed up their traditional activities, rather than engender qualitative new practices. When it comes to the more activist-based "alter-globalisation movement", on the other hand, she has found that the use of the Internet is an integral part of an organisational model that is open, flexible and decentralised (Kavada, 2006). This organisational model has been seen as a new form of collective organisation, and it has been argued that these practices should be seen as "convergence spaces" rather that formal networks or organisational structures (Kahn & Kellner, 2004; Routledge, 2003). These "convergence spaces" represent what is new about Internet-enabled politics; a decentralised and non-hierarchical structure, immediate solidarity, communication and alliance-building across space, and a diffuse networked force that challenges neoliberal globalisation. Or as Illia (2003, p. 326) writes of political campaigns on

the Internet, the pressure on companies "is no longer the result of a long aggregation into association, but of an immediate and spontaneous network of relationships."

Yet it remains that infomediaries only collect or transfer information about a small proportion of the many long-distance commodity chains that traverse the globe. Even though much critical research has tracked the chains of coffee, chocolate, sports shoes and myriad other high-profile objects, spotlight effects rarely touch the mundane and everyday objects that surround our everyday existences. The chains of everyday and mundane objects like cabbage, carburettors and cat food thus remain largely invisible.

Most importantly, by definition, infomediaries *mediate* information, adding a dense layer of social, economic, political and technological arbitration between nodes and information access points. Therefore, while networked practices and communication technologies have selectively increased transparency, there remain significant constraints on the transformative potentials of projects designed by infomediaries. However, a recent shift in both virtual production practices and the availability of networked information have led a number of commentators to point to an emerging third model of the relationships between information flows and distance; a model of information flow that has sparked not only a new way of imagining the links between place and information, but one that has also been integral to the implementation of a host of projects that aim to fundamentally transform the politics of consumption.

3 The Internet of Things

"what we're contemplating here is the extension of information sensing, -processing, and -networking capabilities to entire classes of things we've never before thought of as "technology"" Greenfield (2006: 19).

"The distinction between 'real' and 'virtual' is becoming as quaint as the 19th century distinction between 'mind' and 'body.' We want to bring about a connectivity between the physical world, its objects and spaces, and the virtual world of Web sites and environments."
- Usman Haque, Pachube.com

The Internet of Things refers to the coding and networking of everyday objects and things in order to render them individually machine readable and traceable on the Internet (Biddlecombe, 2005; Butler, 2006; Dodson, 2008; Gershenfeld, Krikorian, & Cohen, 2004; Lombreglia, 2005; Reinhardt, 2004; Shannon, 2005). Much existing content in the Internet of Things has been created through coded RFid tags and IP addresses[3] linked into an electronic product code (EPC) network.

Imagining the Internet of Things being used to track object like a can of cola or a box of cereal from sites of production to sites of consumption is perhaps not too difficult of a stretch of the imagination. However, there is a movement is underway to add almost every imaginable physical object into the Internet of Things. In New Zealand, for example, all cows will have IP addresses embedded onto RFID chips implanted into their skin by 2011 (Wasserman, 2009). This will then allow producers to track each animal through the entire production and distribution process. Furthermore, objects are increasingly able to not just be characterised by a unique identifier, but transmit location and context-sensitive data.

The development of the Internet of Things has been primarily driven by the needs of large corporations who stand to benefit greatly from the foresight and predictability afforded by the ability to follow all objects through the commodity chains they are embedded into (Lianos & Douglas, 2000). The ability to code and track objects has allowed companies to become more efficient, speed up processes, reduce error, prevent theft, and incorporate complex and flexible organisational systems (Dodge & Kitchin, 2005; Ferguson, 2002).

[3] An IP address is a label assigned to any object that uses the Internet Protocol for communication.

Analysts predict that with the new Internet of Things, "'users' of the internet will be counted in billions and…humans may become the minority as generators and receivers of traffic" (International Telecommunication Union, 2005). Adam Greenfield (2006: 19) perhaps best captures the move towards and Internet of Things by arguing that "ever more pervasive, ever harder to perceive, computing has leapt off the desktop and insinuated itself into everyday life. Such ubiquitous information technology "everyware" – will appear in many different contexts and take a wide variety of forms, but it will effect every one of us, whether we're aware of it or not."

In fact, there are so many objects that have already been assigned IP addresses that analysts predict that all 4.3 billion addresses will run out by 2010 or 2011 (Dodson, 2008). The solution to this problem is the new IP system of addressing. Under the new system there will be 2^{128} potential addresses (this is the equivalent to 39,614,081,257,132,168,796,771,975,168 addresses for every living person). The sheer immensity of potential addresses reflects the fact that many powerful voices are within the organisations that oversee the architecture of the Internet (such as the Internet Engineering Task Force) foresee an Internet of Things in which most of the objects that are made and sold are addressable and linked to databases of information.

Blending the physical and the virtual by tagging actual products with networked information produces new spaces for consumption politics. It has also led some commentators to wonder whether objects are becoming sentient (Thrift & French, 2002; Tuters & Varnelis, 2006; Want, Fishkin, Gujar, & Harrison, 1999), and to argue that we are approaching a future filled with "rhizomic assemblages of power/knowledge" (Dodson, 2004) where codes become part of the "technological unconscious" (Thrift, 2004) . Dodge and Kitchen (2005) argue that this growing pervasiveness of identification codes and informational systems to monitor and

regulate population works to create a universal panopticon that will enable its users to "know simultaneously and in real time the what, when, and where of people and things."

In order for the Internet of Things to incorporate the billions of objects that are made, moved, and consumed, it could be assumed that every one of those objects would require a unique identifier (through a combination of cheap RFID and IP addresses). However, a number of commentators are now arguing that it may not be necessary to physically tag and code every single physical thing in order to bring the Internet of Things into being. Such arguments are based on the fact that there has been a transfiguration in the ways that information is created and made available on the Internet. Even without barcodes, RFID tags, and IP addresses on every physical object, a practice known as cloud collaboration, peer-production, Web 2.0, or Web Squared has brought together a critical mass of data about many aspects of the physical world.

4 The Second and Third Generations of the Internet

"We are meeting the Internet, and it is us." – O'Reilly and Battelle (2009)

"The undeclared logic of the machine-readable world is `all data, all the time, on all people, at all places'" (Dodge & Kitchin, 2005).

This metamorphosis in the production and accessibility of digital information has until recently been most often described as Web 2.0: or the second wave of the Internet. Web 2.0 is generally characterised by user-generated information, user-centred design, sharing of information and the collaborative development of knowledge. In principle, anybody, anywhere on the planet with the requisite hardware and software and an Internet connection

can now contribute to Web 2.0 projects like Wikipedia, YouTube or Flikr; thus implying that 1.7 billion people (the current number of Internet users), with almost one trillion Internet devices can potentially create, upload, and share information about any aspect of the world (Beer, 2008; Breen & Forde, 2004; Goodchild, 2007; Kelley, 2005; Richtel, 2009).

More recently there has been talk about a move towards another paradigm shift in how people use the web: Web Squared. Tim O'Reilly (the inventor of the term Web 2.0) and John Battelle argue that Web Squared refers to the Internet becoming more intelligent as an exponentially increasing amount of content is being created and uploaded. The innovation of Web Squared is that a sufficient body of data exists in order to allow the web to "learn" inferentially, absorbing more knowledge than that is purposely entered into it. To O'Reilly and Battelle, the Internet is:

> ...no longer a collection of static pages of HTML that describe something in the world. Increasingly, the Web is the world – everything and everyone in the world casts an "information shadow," an aura of data which, when captured and processed intelligently, offers extraordinary opportunity and mind bending implications. Web Squared is our way of exploring this phenomenon and giving it a name (O'Reilly & Battelle, 2009: 2).

A variety of authors see cloud collaboration and Web Squared as the basis of an informational revolution, predicting it to fundamentally change the ways in which decentralised collective intelligence about objects moves through the world (Graham, 2010b; Jennings, 2008; O'Reilly, 2005; Vogelstein, 2007; Whitlock & Micek, 2008). Information about commodities and things is constantly being collected and uploaded (often in real-time), and as a result:

> ...we'll get to the Internet of Things via a hodgepodge of sensor data contributing, bottom-up, to machine-learning applications that gradually make more and more sense of the data that is handed to them. A bottle of wine on your supermarket shelf (or any other object) needn't have an RFID tag to join the "Internet of Things," it simply needs you to take a picture of its label. Your mobile phone, image recognition, search, and the sentient web will do the rest. We don't have to wait until each item in the supermarket has a unique machine-readable ID. Instead, we can make do with bar codes, tags on photos, and other "hacks" that are simply ways of brute-forcing identity out of reality (O'Reilly & Battelle, 2009).

In other words, Web Squared brings about possibilities to tag information directly onto previously non-networked objects. It relies on people to act as networked sensors to fill in gaps not covered by rfid tags, IP addresses, and other forms of tracking and information storage (see also Goodchild, 2007) by uploading imagery, video, motion, proximity and location data. It thus follows that ultimately few objects will be able to exist "outside" of the network.

For the transparency of commodity chains, these developments can significantly decentre the role of infomediaries in the collection and transmission of information about the sites of production. The technologies theoretically enable bypassing layers of arbitration and provide an immediate mapping in cyberspace of information on commodity chains, either at the hands of end-users or as a result of direct Internet absorption of information. This technological infrastructure can therefore become interlinked with an empowering consumer activist politics that tags commodity chain information onto products in new ways, articulating new relationships between proximity and transparency. Web Squared and the Internet of Things thus potentially provides a model for the future similar to the model

presented in figure 5: a critical mass of data, ubiquitous computing, and intelligent systems allow frictions of distance to be effectively negated. In other words, the Internet of Things and Web Squared can be used to bring into being a new layer of information that lets consumers see the histories and geographies of any commodity, to see its existence beyond the here and now.

References to ubiquitous information abound within the myriad projects attempting to use the informational model presented in figure five to inspire a new politics of consumption[4]. It is not just that communication technologies can transport consumer information instantly across space (something that has been possible ever since the invention of the telegraph). Rather, these new technologies provide a potentially widely accessible infrastructure for virtual mapping of product information, and make that mapping available in everyday life. They can integrate consumption practices with on-the-spot product information accessible through mobile phones for instance. Consumer activism is thereby shifted from collecting the data to a more decentralised model focused on creating the software allowing consumers to take part in cloud collaboration and make use of cloud generated information. This allows a consumer to pick up a box of Kleenex at the supermarket, scan it with her cell phone, and get access to wiki sourced information about the environmental impact of the production process, and this environmental record compares with that of non-brand competitors. For food products, customers can access information on nutrition values, gene modification, transportation distance, labour conditions and so on through the cell phone.

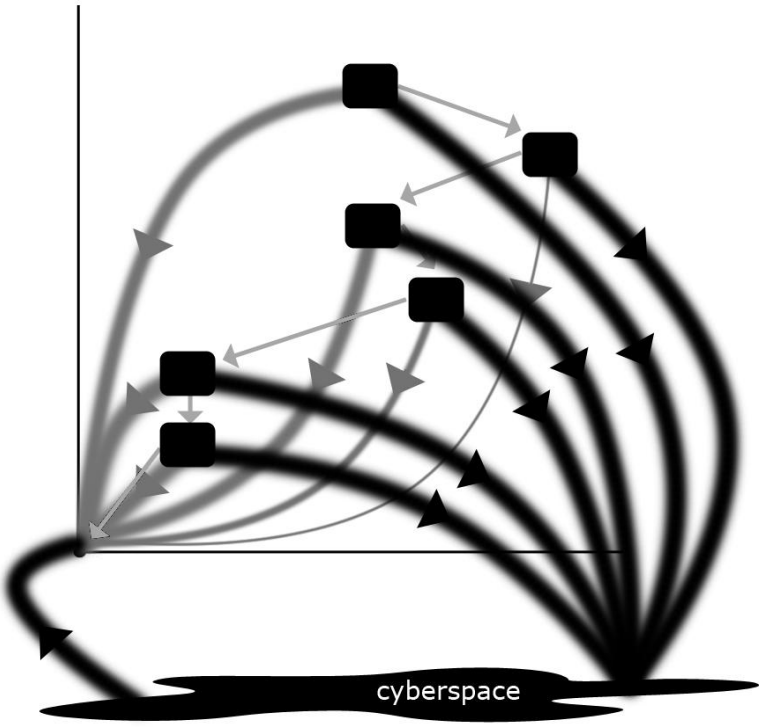
The leader of one such project, designed at the 2007 London Social Innovation Camp, described his technology by noting that: "We set out to try and make something that links products in the real world to information on the Internet using barcodes. So, making any

[4] Examples include: alonovo.com; barcodepedia.com; buyitlikeyoumeanit.org; consumergadget.net; en.consumeria.info; en.semapedia.org; ethicalconsumer.org; ethiscore.org; Fair Tracing Project; gooshing.co.uk; howstuffismade.org; makeitfair.org; seewhatyouarebuyinginto.com; wikichains.com

product, anywhere, addressable on the Internet and in real-life" (http://jonathanmelhuish.com/2009/02/barcode-wikipedia). The founder of another project similarly claims that:

> We are still living in a world where information is trapped in a few of our objects. We stare into our screens, which are like goldfish bowls full of information swimming around, but unable to escape…we dream of a world where information would be a butterfly, flitting freely all over the place, and occasionally landing on any of the objects we touch to give them life and enrich them. Rafi Haladjian. Violet.net

Figure 5: Web Squared and Ubiquitous Information



Such visions seem, in many ways, to come dangerously close to technological determinism. Since Marshall McLuhan introduced the notion of the 'global village', or the

idea that ICTs can bring all of humanity into a shared virtual cyberspace (McLuhan, 1962), commentators have speculated that the internet would be able to shrink (or even eliminate) relative distances. Gillespie and Williams (1988), for example, have argued that the convergence of time and space brought about by ICTs would eliminate the geographic frictions which help to shape spatial differences (see also: Cairncross, 1997; Couclelis, 1996; Pascal, 1987). The idea that the internet could either render geography meaningless or create a 'global village' accessible from all corners of the planet, is grounded in the notion that the internet allows an almost instantaneous transfer of information to any connected device, becoming both an ethereal alternate dimension which is simultaneously infinite and everywhere, and fixed in a distinct (albeit non-physical) location where all participants "arrive" (Graham, 2010a).

Yet geographers have constantly reminded potential determinists that the Internet is grounded by supporting infrastructures with distinct geographical biases (Dodge & Kitchin, 2001a; Hayes, 1997; Moss & Townsend, 2000; Townsend, 2001; Zook, Dodge, Aoyama, & Townsend, 2004). The 'global village,' or cyberspace, can therefore only come into being in *specific geographic spaces*. Furthermore, it has also been shown that interactions and content in cyberspace continue to be both socially produced and shaped by geography (c.f. Adams & Ghose, 2003; Dodge & Kitchin, 2001b; Graham, 2009; Zook, 2003).

Despite these repeated claims that "geography still matters," even a cursory look at most of the projects employing Web Squared and the Internet of Things to alter consumption politics reveals a renewed attachment to the idea that technology can be used to fundamentally transcend the barriers of distance. But, given the seemingly unique nature (and powerful combination) of Web Squared and the Internet of Things, it is instrumental to more carefully consider the ways in which barriers to the flow of information could potentially be transcended. This can be done in two ways: first, by imagining that the Internet of Things and

the peer-production of information could bring into being ubiquitous information about global commodity chains; and second by reflecting on persistent barriers to the flows of Information.

5 Barriers to the Ubiquity of Information

If Web Squared and the Internet of Things were to allow ubiquitous access to information about nodes on global commodity chains, the mass of data about all of those nodes would still need to be organised. The following section therefore briefly focuses on the two most widely used methods to index and organise large amounts of data: the wiki model and the search engine model.

Wikis allow websites to become containers of user-generated information and knowledge established through consensus. Wikipedia is the prime example of a wiki model, with a stated mission of hosting "the sum of all human knowledge" in every human language (Dodson, 2005). The encyclopaedia currently contains twelve million articles in 262 languages. However, other wikis also contain enormous amounts of information created through cloud collaboration (e.g. WikiAnswers: a site containing 9 million questions and 3 million user submitted answers, and Baidu Baike: the largest Chinese-language encyclopaedia containing 1.5 million articles). In principle, wikis have the potential of globalising information and making it freely available, because they generally not only allow free access, but in addition allow anyone to contribute from anywhere: an exercise in both anarchy and democracy that radically opens-up the knowledge-creation process (Ciffolilli, 2003). They generally allow anonymous contributions, and so do not discriminate based on professional credentials, race, sex or any other personal characteristic (Graham, 2010b).

Wikis allow the indexing of structured and codified information (e.g. product codes and ISO numbers), as well as more qualitative unstructured information (e.g. photographs of factories, videos of production sites etc.). The relative lack of hierarchy in the editing process

means that content can in principle also be moved, changed, and deleted instantly, corresponding to the rapidly changing composition of commodity chains. This allows for a cloud collaborative development of knowledge about commodity chains without the need for, or interference of, formal infomediaries.

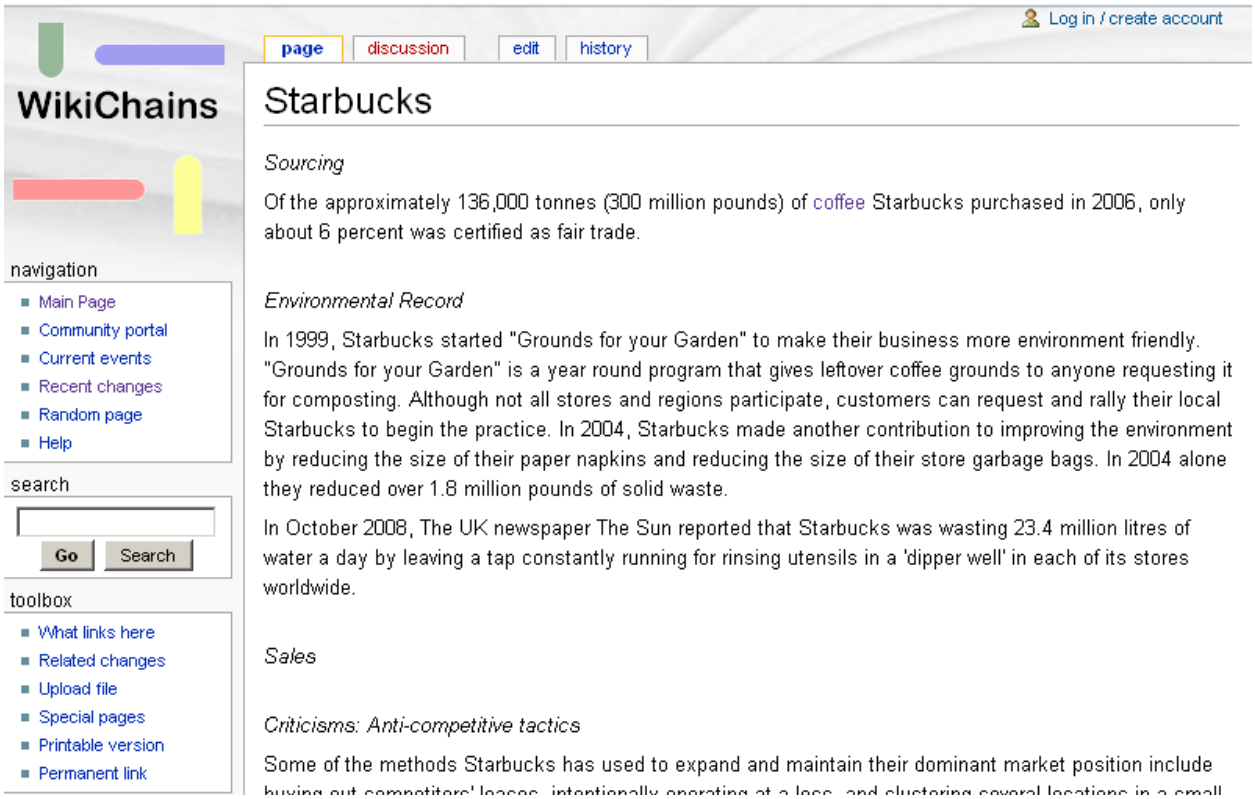
But despite this openness, it remains that a core characteristic of wikis is that they necessitate agreement. Any object or node on a commodity chain can only be represented in one way (see figure 6). So on any topic or any node of any commodity chain, there is the visible information that gets included and the invisible information that gets excluded. Disagreement and debate about visible content is therefore a necessary feature of wikis, and within those debates there are always winners and losers. Research on Wikipedia, for instance, has show that not only are a tiny minority of users the creators of most content[5], but that methods employed to resolve disagreements are frequently opaque and usually favour distinct demographics (young Western males) (O'Neil, 2009).

Centralised search systems like Google Earth offer a fundamentally different way of organising information. Multiple representations of the same nodes on chains can coexist in cyberspace by tagging information to specific points on a chain (or the Earth). In figure 7, for example, multiple representations can be tagged to the Cadbury factory in Bourneville, England, without any need for agreement about which is the most correct or accurate. Using a centralised search system instead of a wiki to search through masses of data means that multiple representations of any node can exist and there is no need for consensus. Thousands of sources could potentially be tagged to any node on any chain, allowing for multiple simultaneous representations. However, not all information tagged to any node is equally visible or accessible. Nodes containing rich layers of information necessitate sorting, ordering, and ranking systems that are inherently hierarchical. Research has shown that

[5] Only about one tenth of one percent of Wikipedia users are actually regular contributors.

ranking systems inevitably promote already highly visible parts of the Internet into highly visible positions, and assign less visible parts of the internet into marginal positions in the rankings. Languages and cultures with large internet presences (e.g. the English and the U.S.) are also likely to have higher ranks. Ranking algorithms thus essentially become a governance system for the Internet (Zook & Graham, 2007a, 2007b).

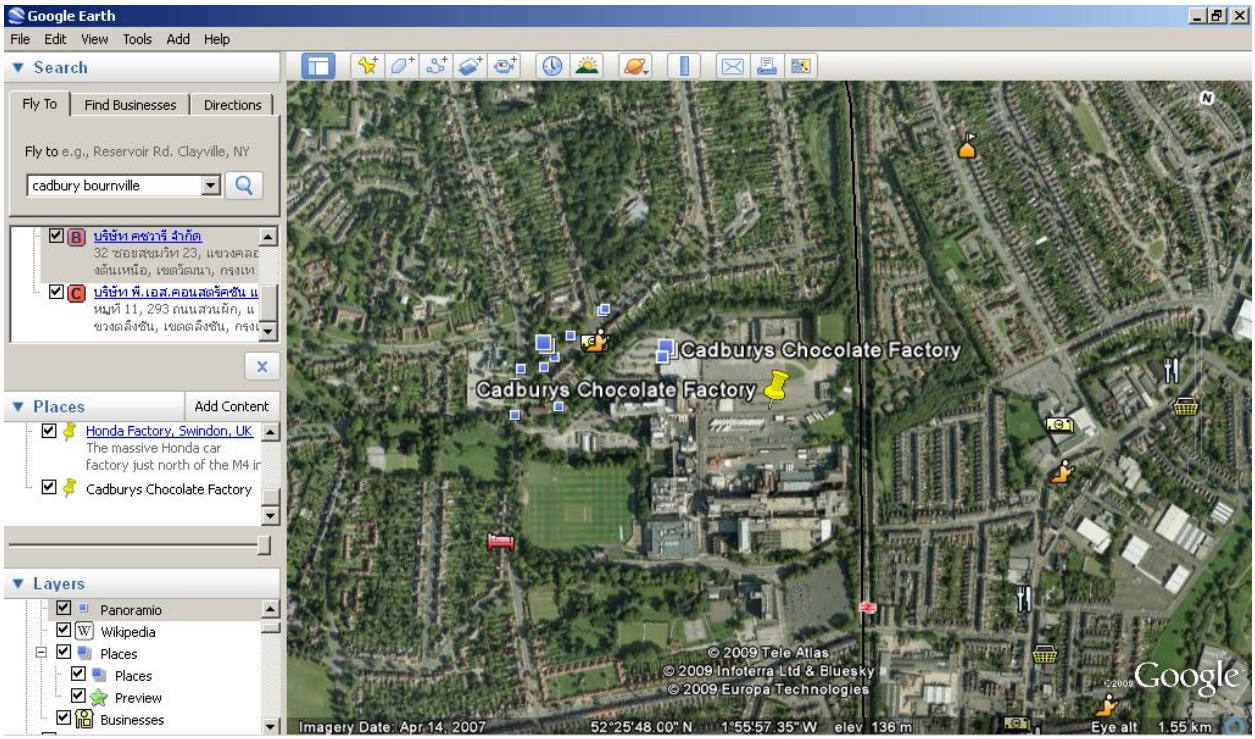
Figure 6: An example of a wiki page



These two examples illustrate that even if the Internet of Things and Web Squared could bring together a critical mass of data about global commodity chains, the power-relationships built into any system always serve to make some information visible at the expense of others. A state of ubiquitous information as represented in figure 5 is therefore unlikely to ever come into being. However, it is important to point out that because such a model of information flow relies on the citizen as a sensor to fill in the gaps left uncovered by

rfid tags and ip addresses and create a layer of information that is global in scope, the distinct geographical biases to the peer-production of information can serve to contribute to the continuing opacity of information flow about nodes in commodity chains. The information shadows of objects will thus always be densest in the most highly networked parts of the world. While it is conceivable for a critical mass of people in the Global North to act as sensors for the Internet of Things, it remains unrealistic to expect Bangladeshi textile workers, coffee growers in Papua New Guinea, or Kenyan flower pickers, and most of the rest of the world to act as networked sensors, when most workers at those sites of production possess neither the knowledge nor the resources to be able act as sensors for the digital world.

Figure 7: An example of the search model



6 Conclusions

By globalising knowledge, the Internet of Things and the peer production of information offer an opportunity to empower marginal individuals and communities throughout the Global South. Transnational corporations would no longer be able to conceal poor production practices and exploitative labour conditions behind the veils of distance that have for so long separated the sites of production and consumption. As Web Squared and the Internet of Things alter the opacity of distance, and knowledge about sweatshops, child labour, exploitation, and environmental damage becomes only a few clicks on a computer or mobile phone away from a consumer, which opens for radical shifts in the practices of development. Consumers of commodities in the Global North would be able to better distinguish between the glossy (and often exaggerated) claims made by many TNCs that pertain to the benefits they provide to workers in the developing world, and the commodities and chains that truly do result in tangible benefits to producers in the Global South.

However, as many commentators have already noted, the Internet also replicates the structures of class and power of the societies in which it is embedded (Warf, 2001). A variety of factors will contribute to the continuing opacity of information flow about nodes in commodity chains. In the case with wikis, for instance, where methods employed to resolve disagreements are frequently less-than-transparent and often favour distinct demographics (O'Neil, 2009). Control of information continues to characterise much of the technology behind the Internet of Things, and large amounts data being created through cloud collaboration are often subject to a variety of licensing restrictions since a majority of Web 2.0 websites are run by for-profit companies (Graham, 2010b). The incorporation of everyday objects into a non-open Internet of Things raises a plethora of concerns such as privacy (Phillips, 2003), surveillance, black holes of information, bias, and geoslavery (Dobson & Fisher, 2003).

Further, if people are to act as networked sensors, this involves only those with the resources, capabilities, and skill-sets to do so. This fact therefore excludes large segments of people in the Global South; and the Internet and cloud collaboration will continue to have geographical and commodity chain-topological black-holes. Wikis and search engines contain embedded assumptions, laws, and power-relations that prevent some information from becoming visible while highlighting other information. Finally, realisation of the potential for transparency depends not only on technological infrastructures but on *how* these are taken advantage of by social practices seeking to invigorate a politics of consumption.

This paper has argued that in place of imaginations of ubiquitously available information about any product, anywhere, addressable on the Internet and in real-life, it is important to remember that there will always be nodes on many chains that are kept invisible. Peer-production and the networking of everyday objects will in many ways allow for a greater variety of spotlight effects on nodes in chains that would otherwise remain cloaked and invisible. But, it remains important to continuously question the invisibility of particular nodes, the geographies of information creation, and the politics of ranking and visibility, rather than uncritically imagining that technologies have brought about a "global village" of universally accessible information.

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