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## **Ethics of Waste in the Information Society**

edited by Matthias Feilhauer and Soenke Zehle

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Announcement

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## Editorial: On IRIE Vol. 11

IRIE, designed as a pure online journal, new issues announced by email, downloadable and fully readable as e-paper – in 2003 the founding editors really thought they have created a zero waste journal. But now we learned that much more has to be taken into account if one really wants to calculate the ecological bottom line of IRIE, including the electricity consumed by hosting the journal as well as reading it and above all the construction *and* disposal of the hardware engaged. Ultimately this expansion of the scope of our respective self assessment leads to an expansion of the scope of information ethics itself.



Figure 1: Monitor trade – Lagos, Nigeria - © Kristian Buus, (<http://kristianbuus.com>), Greenpeace Int

With this issue, IRIE – dedicated to the development of information ethics as a reflexive practice and conceptual horizon – aims to engage itself with the broad range of materials involved in the very acts and processes of communication, information, and knowledge production. This includes, but is not limited to, the instruments we employ,

use, and discard in ever-shorter cycles of consumption, outpacing our efforts to develop appropriate mechanisms of disposal and recycling: from old television sets to LCD and plasma displays, from old disk drives to flash cards and RFID chips.



Figure 2: E-waste open burning in China  
© EMPA (<http://ewastequote.info>)

Used locally, but designed, produced, and discarded across the world, the usage of these instruments – things – raises a lot of questions whose technical and political implications are increasingly being explored in an emerging regulatory regime, but whose info-ethical dimensions deserve greater attention as they require us to revisit cherished assumptions regarding the scope and desirability of information-societal developments as we know them.



Figure 3: Monitor (CRT) Storage - Hong Kong's New Territories area, © Basel Action Network (BAN) 2009, (<http://www.ban.org>)

The contributions to this issue offer the concept of network ecologies as a way to open info-ethical reflection to geophilosophical perspectives (Zehle), revisit the history of electronics activism and regulation (Smith, Fonseca and de Carvalho Matie-

lo), reflect on the need to rethink waste or debris as resource for socio-technological innovation and survival (Vallauri, Renno), attend to the ecological impact of networks of distributed labor (Miller) and the biopolitical dimension of the simultaneous governance of waste and work (Rossiter), remind us of the material embeddedness of all info-ethical, geophilosophical reflection to encourage the embrace of an ethics of passage (Carter), and insist on the need to take abundance rather than scarcity as point of departure and reference and develop holistic approaches attentive to their complex relationship (Verzola).

Together, the authors offer themselves as interlocutors in info-ethical exchanges, some directly,

some from within different (perhaps even incommensurable) analytical frameworks, recalling that acts of translation are always already involved in any attempt of ethical reflection.

Sincerely,

Matthias Feilhauer, Soenke Zehle  
and the editors



Please do not print this issue unless you really need to ;-)

Soenke Zehle:

## Network Ecologies: Geophilosophy between Conflict and Cartographies of Abundance

### Abstract:

In the context of network-ecological thought, information ethics is perhaps best understood as a transversal reflexive practice, aimed at identifying the stakes attending the creation, consumption, and disposal of information technologies. To situate itself as well as potential interlocutors, such a thought requires correspondingly complex cartographies, a multidimensional mapping of practices and presuppositions, of individual, collective, institutional actors as well as the conditions of possibility of their mutual engagement. Such cartographies do not assume the existence of the „local“ or the „global“ as a given. Instead, they attend to the way human and non-human actors and the discursive and material practices they are involved in contribute to construction and reconstruction of geocultural formations. Reapproached from within such a „network-ecological“ horizon, information ethics becomes geophilosophy, generating new modalities of intervention in the conflictual dynamics associated with the social-economic life of waste.

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#### • Relevant Publications:

- „Kein Anschluss? Green IT ist noch nicht Fair IT.“ c't 5 (2008).
- „Network Ecologies: Documenting Depletion, Exhausting Exposure“. Urban China 33 (2008).
- „Toward a Cosmopolitics of the Commons: When Eco-Politics Meets Info-Politics.“ In Butt, D., Bywater, J., Paul, N. (Eds), Place: Local Knowledge and New Media Practice. Newcastle upon Tyne: Cambridge Scholars Publishing, 2008.
- *incommunicado reader*. Eds. Geert Lovink and Soenke Zehle. Amsterdam: Institute of Network Cultures, 2005.
- „Notes on Cross-Border Environmental Justice Education.“ In Adamson, J., Evans, M. M., Stein, R. (Eds), The Environmental Justice Reader: Politics, Poetics, and Pedagogy. Tucson: University of Arizona Press, 2002.
- „Het Virtuele Water : Over de Hydropolitik van de IT-boom.“ In AS: media tijdschrift 160 (2001).
- „Eco-Politics at the Site of Virtual Production: Environmental Justice Organizing in Silicon Valley.“ In Angermüller, J., et al. (Eds), Hybrid Spaces: Theory, Culture, Economy. Münster: Lit Verlag, 2000.

## Info-Ethics as Geophilosophy

The idea of nature as an aesthetic and normative exteriority appears to offer a safe position of ethico-epistemological privilege from which to condemn various aspects of information-technological modernization. But it is perhaps only by acknowledging that the contradictory consequences of the spread of electronics cannot be easily mapped onto an antagonism of nature versus technology that the idea of network ecologies becomes comprehensible.

Defined here as a conceptual framework as well as a broad transversal practice that mobilizes multiple understandings of the ecological - cultural, economic, political, social - in its approach to digital media and its wide-ranging effects, network ecologies are an attempt to reframe questions associated with the (toxic) materiality of information technology in non-dichotomous ways.<sup>1</sup>

To speak of network ecologies is to conjoin two terms that appear to refer to different and distinct epistemological and ontological domains. In its most basic sense, „network ecologies“ might simply be (mis)read as a reiteration of a culture/nature dichotomy, of old questions regarding the „two cultures“ assumed to constitute and maintain such a dichotomy, and of the difficulty of bridging the gap that both defines and divides them.<sup>2</sup> Instead, „network ecologies“ is an attempt to bring into play, remix and translate two sets of concepts, one origi-

nating in the world of socio-technological infrastructures of interdependence, their protocols and modes of production, another in the world of biological processes, their complexity and organicity.<sup>3</sup>

Needless to say, these worlds overlap, and are involved in a process of mutual constitution and configuration, but the dominant „distribution of the sensible“ (Jacques Ranciere) maintains their separation. As such, one of the first tasks of a network-ecologically inspired information ethics is to make visible how and why such a distribution of the sensible is maintained, attend to its roots in specific discursive and regulatory regimes, and explore its effects, including the separation of activist agendas and organizing efforts that could challenge this distribution if they were to overcome such a separation and in fact propose (and enact) a different sense of „worlding“. Far from a thorough ideal-typical conceptualization, the following sketches identify distant points on a continuum to focus on what is involved in efforts to cut across this separation of worlds.

The world of socio-technological infrastructures of interdependence is still largely dominated by a cyberlibertarian approach that celebrates the promise of dematerialization-through-technology. This includes an affirmation of the potential for democratization, mainly of expression and access, especially through the comparatively low cost of digital reproduction, less often understood in the broader terms of a reconfiguration of cultural, economic, and political relations and other forms of democracy beyond a logic of representation. Similarly, a variety of concepts of freedom are invoked to promote a capacity for self-organization vis-à-vis statist governmentalities as well as corporate self-regulation. The focus on civil and political rather than economic, social, or cultural rights is shared by actors from state, market and (un)civil society. Far beyond its information-technological milieu of origination, such a perspective has been adopted, incorporated and translated into multiple local idioms and political traditions, ranging from anarchic to neoliberal. Often framed by a vision of technological transcendence and the promise of a new type of clean (paradoxically post-industrial) industrialization, this approach has facilitated the reproduction of the Silicon Valley template – the establishment of governmentally-subsidized high-tech clusters – across the globe and

<sup>1</sup> Such a broad understanding of ecology is informed by a number of philosophical perspectives, including the work of Felix Guattari and Isabelle Stengers and their concerns with the modalities of the production of subjectivity, the emphasis on an affirmation of the capacity for self-organization, and the potential of a truly cosmopolitical understanding of politics (beyond subject-object distinctions and a logic of representation).

<sup>2</sup> Many references to ecology reaffirm not only a separation between natural and symbolic environments, but an understanding of the ecological as a sphere ruled by equilibrium rather than conflict and complexity, and correspondingly cast (and constrain) information, knowledge, and media ecologies as so many efforts to promote hygiene (order) in our spheres of communication. This is not what is meant here. There are no two cultures, or more precisely, their existence is a consequence of very specific disciplinary and methodological settlements. These have been stabilized by an intra-institutional division of labor (especially, but not exclusively, in the university) that frequently invokes essential epistemological and ontological differences without being able to substantiate them (which is one reason why network ecologies have no single disciplinary location in the academic research matrix).

<sup>3</sup> As such, the term „network ecologies“ serve as a heuristic device, an analytical tool to explore the constitution and the (material) effects of such a separation.

attached itself successfully to numerous iterations of IT policies aimed at the promotion of employment and wealth through creativity and innovation.

The world of biological processes continues to frame environmentalisms, whose mainstream and conservationist varieties (and their roots in colonial wilderness aesthetics) have by now been thoroughly examined but failed to fundamentally alter their anti-urban bias and corresponding lack of interest in urban populations. Many environmentalists have codified a purified wilderness aesthetic of distinctly Euro-American provenance as the epitome of an ecopolitical sensibility, obscuring the extent to which the very idea of a „wilderness“ has historically been intertwined with colonial *terra nullius* doctrines and the displacement of indigenous peoples. Still a dominant, if no longer uncontested, perspective in international environmentalism, mainstream concepts of sustainability have further compromised the potential reach of ecopolitical approaches by foregrounding market-based responses to environmental crisis. Alliances with labor organizations (green jobs, occupational health and safety) have been the exception not least because for many environmentalism concerns itself with non-human nature alone. Often understood in terms of „post-material“ needs, such environmentalisms have been conceptually and institutionally articulated over and against the traditions and organizations of class-based politics. Because of their essentialist tendencies, such environmentalisms have been similarly reluctant to engage questions of migration.

The aim of network ecologies is not a politics of nature that promises to simply ground an information-technological discourse seemingly limited by its fascination with a new brand of post-industrialism. Nor are network ecologies needed to advance corporate accountability, resource efficiency, zero waste, bans on the export of hazardous wastes, or other approaches already promoted by electronics activists. But ecological crisis is not so much (or not only) the consequence of an objective assessment of ecological degradation that identify 'limits of growth', 'maximum footprints', etc. Crisis occurs because of challenges to hegemonic conceptualizations of nature and their administrative-technocratic institutionalization in specific regimes of accumulation and appropriation. Network ecologies can perhaps map this crisis.

Like most ecopolitical concerns, e-waste is simultaneously a cultural, ecological, economic, ethical, legal, natural-scientific, philosophical and technological issue that evades – perhaps even defies –

disciplinary and methodological territorialization. Approached from within the analytical horizon of network ecologies, „e-waste“ remains a complex, even elusive referent, not easily stabilized either as an object of regulation and governance or as an active agent in the restructuring of economies and environments. Consequently, at least in the context of this issue, the aim is less to specify a definition to be operationalized (this already occurs in existing policy and research efforts) than to think of the shifting meaning of such a term as complementary points of entry for info-ethical inquiry and conceptualization.

In the context of network-ecological thought, information ethics is perhaps best understood as a transversal reflexive practice, aimed at identifying the stakes attending the creation, consumption, and disposal of information technologies. To situate itself as well as potential interlocutors, such a thought requires correspondingly complex cartographies, a multidimensional mapping of practices and presuppositions, of individual, collective, institutional actors as well as the conditions of possibility of their mutual engagement. Such cartographies do not assume the existence of the „local“ or the „global“ as given. Instead, they attend to the way human and non-human actors and the discursive and material practices they are involved in contribute to construction and reconstruction of geocultural formations. In short, reapproached from within such a „network-ecological“ horizon, information ethics becomes geophilosophy, generating new modalities of intervention in the conflictual dynamics associated with the social-economic life of waste.

Migrating in and across both of the worlds of socio-technological infrastructures of interdependence, and the world of biological processes, our information-technological gadgets have become complex combinations that involve hundreds of materials, multiple knowledges and numerous sites of production, use, and disposal. It is because of this complexity that network-ecological reflection might as well take these gadgets as its point of departure and reference. Such reflection is necessarily transversal, cutting across many sectors and fields – of design and development, of research and scientific knowledge production, of activism, governance and regulation. This transversality also makes it more complex – much more complex than the common invocation of the „local“ and the „global“ might have it – and necessarily involves choices: what does and does not end up on such a map, what kind of visibility is such a map meant to create, what kind of activity and what kind of politics is it designed to

enable? It is here that the question of ethics asserts itself, giving information-ethics a key role to play in the cartographic practice that is geophilosophy.

## Sustainable Electronics

The scope and topicality of the current debate around fair, green, and sustainable electronics is itself in need of explanation. Notwithstanding the intensity of current „Green IT“ public relations and re-branding strategies of electronics companies, the sudden visibility of „e-waste“ cannot simply be accounted for by way of reference to a new spirit of corporate responsibility. On the contrary, the current visibility of the topic is itself the consequence of a decade-long effort to make visible the „dark side of the chip“ – mostly a struggle against dominant representations of electronics as a clean industry as well as against the corporate and governmental actors promoting such a view.

The emergent transnational network of organizing around environmental and social justice issues in the global networks of electronics production is arguably one of the most vital area of a „network culture“ that is only gradually engaging broader ecopolitical concerns. In their efforts to initiate and frame this debate, these actors (see below for a list) have already (and successfully) criticized conceptual frameworks that consider environmentalism a post-materialist luxury rather than a matter of survival. In doing so, they have already expanded the ecopolitical idiom to include issues of occupational health and safety or extend the „fair trade“ framework to resource extraction. Electronics activism has defined a comprehensive agenda of environmental and economic justice, drawing on a number of perspectives such as environmental debt, environmental and resource rights, political and social ecology, resource efficiency, and occupational health and safety. Perspectives that reframe 'end-of-life' through experimental strategies of re-use are tapping into multiple traditions of hacktivism, reverse engineering and related peer-to-peer approaches that have been adopted beyond the field of free software development to advance the construction of „free“ or „open“ (non-proprietary) hardware.

In addition to giving rise to concrete initiatives in the areas of fair production, procurement and disposal, electronics activism also encourages a re-appropriation of the notion of sustainability. Since the 1992 UN „Earth Summit“, sustainability has featured prominently in policy initiatives. For some the policy outcomes have been discredited by their

vagueness and widespread subordination to corporate visions of self-regulation. For others, however, the sustainability trope should be more usefully reconceptualized in terms of the outcomes of ecological distribution conflicts. According to ecological economists, neoclassical economics must be challenged not only because of its one-size-fits-all commitments to „trade liberalization“ and export-oriented growth, but because its conceptual idiom is incapable of articulating the conflicts such commitments – and the policies based on them – necessarily provoke and aggravate. The agendas of mainstream and increasingly corporate environmentalisms articulated around the idea of sustainability often render these conflictual dimensions of struggles over nature invisible.

Beyond consensus-oriented paradigms of environmental governance, network ecologies must take seriously this antagonistic dimension. Reapproached from such a conflictual perspective, e-waste finds itself less a passive object of environmental governance than an active element in numerous situations of conflict. Its generation and (still largely illegal) dissemination is inscribed in the matrix of old North-South and new East-West conflicts over resource access and distribution, anxious foreign policy exchanges debating the merits of a securitization of global resource flows (indicating a resignification of e-waste as element in national resource strategies), volatile financial markets thriving on resource futures, and the explosion of foreign (especially Chinese) direct investment in raw materials extraction across the Global South. A simple return to a politics of nature can neither identify the eco-social cost of such developments nor enable corresponding forms of political mobilization. Here, too, information-ethics has a key role to play in the comparative analysis of concepts of (distributive, environmental, social) justice, and in the affirmation of concepts of the political that address antagonism as key feature of eco-politics rather than merely manage it in a politics of consensus.

## Cartographies of Abundance

Of all the suggestions proposed by contributors to this issue, it is perhaps the affirmation of the primacy of abundance over scarcity that is most startling in dealing with what offers itself so obviously as an environmental and social crisis – the generation of massive amounts of discarded electronics and their global disposal. The crisis media strategies that feature images of e-waste disposal sites from across the world stress the urgency of new forms of regula-



tion. And indeed, given the scope of the crisis, such images call for a politics of emergency. Notwithstanding its positive effects (immediate phase-out of toxic substances, higher occupational and health standards, open architectures that facilitate recycling and reuse), such a politics may come at a cost if it reduces the possible impact of such images of social and environmental transformation to a mere invocation of the logic of accountability, itself the core concept of a politics of representation that delegates key tasks of cultural, economic, and social innovation.

If charting cartographies of abundance can be a first step, it can only do so from within a broad (geophilosophical) horizon that does not limit itself to a logic of accountability, as important as such demands have been (especially in the call for extended producer responsibility to advance new green design and take-back strategies). Rather than bringing into being new forms of governance, attending to the question of waste has a much broader potential to disrupt the dominant „distribution of the sensible“. What runs across all contributions is a call to shift from the language of waste to one of potentiality, to open possibilities of interaction far beyond the superficial sense of “Web 2.0” features – possibilities of participating, instead, in the design and construction of our information and communication technologies, and of creating corresponding (cultural, economic, social) conditions of possibility.

Abundance offers itself as an effective term to counter the exclusive emphasis on scarcity, and at least complement narrow senses of „freedom from“ (interference). Abundance is about the „freedom to“ create, share, but also live in an unpolluted environment or access resources essential to biological and cultural survival. The illegal disposal of e-waste is troubling not merely because it is illegal; whether „legality“ makes it any less hazardous remains to be seen, as this involves a variety of struggles over thresholds and standards whose determination is itself the outcome of multiple contestations. Toxic releases in the course of production, consumption, and disposal should disturb us because they endanger local resource commons (air, soil, water), linking places affected by such pollution, but also people resisting it in multiple and inspiring ways in a geography of its own.

Because of such „network ecological“ linkages that cut across borders, to think of abundance is to think not only of the commons, but also of the common – of possible figures and socialities in whose name such cross-border strategies of mutual exchange

and support may be advanced. This, too, is a question raised by the images of crisis, but their possible impact will remain limited if we do not take seriously the exhaustion not only of the power of exposure (compassion fatigue) but of a whole range of idioms of solidarity that have lost their ability to engender a post-statist politics that moves across borders (tricontinentalism). Another key question for information-ethics to address: given the globality of the issues under consideration, what is the idiom of relation capable of articulating a new ethics of encounter and mutual engagement?

To ask for such a shift in emphasis – from scarcity to abundance, from accountability to the common – is to ask where the dominance of scarcity originates, and where our mutual (ecological) involvements (of which cross-border flows of products and pollution constantly remind us) is marginalized in the individualist production of subjectivities: where does this knowledge come from, where is it created and maintained, what are the architectures and infrastructures for such processes of education? A network-ecological thought of abundance links the waste in a disposal site to the waste of a „university in ruins“, of academic knowledge production increasingly compromised by the need to maintain commercial paradigms of accelerating research-to-market, and degree systems that are themselves based on a logic of scarcity. To reflect on waste from such a perspective is to ask where the designation as „waste“ is made – in the design phase, where proprietary approaches lock users into single vendors, in standardization debates where closed formats prevent the sharing of content and material, in educational processes where certificates valorize familiarity with proprietary products but don't reward autonomous learning and alternative knowledges? Clearly, „waste“ generates multiple discursivities and agencies. And to explore the transversal connections and exclusions at work firmly links „waste“ to the realm of the political.

Caution is, as always, called for in approaching the selective incorporation of the grassroots into academic strategies of rebranding and reinstitutionalization, as select linkages to extra-academic milieus are perfectly compatible with the pursuit of otherwise rather narrow strategies of „excellence“ and „innovation“. But it is important to remember that cartographies of waste include new research geographies, where a great deal of the empirical research is actually conducted outside the academy. Struggles over the public release of occupational health and safety studies in electronics manufacturing are a case in point, but so are the (unauthorized) re-

leases of safety and toxics information from suppliers, who are thereby retrieved from the relative anonymity of supply networks and reattached to corporate brands, breaking the fire walls between design and manufacturing established through outsourcing strategies. It is for this reason that this issue foregrounds activist actors and agendas. And when we encounter „e-waste“, it us up to us whether we accept the narratives that constitute these objects as waste, or whether we take the opportunity to think about them „from the end“, exploring „waste“ not solely as a problem of environmental regulation but as a radically different vantage point.

## Organizations

- Asia Monitor Resource Center <<http://www.amrc.org.hk>>
- Asian Network for the Rights Of Occupational Accident Victims <<http://www.anroav.org>>
- Basel Action Network <<http://www.ban.org>>
- Bricolabs Shared Network <<http://bricolabs.net>>
- Business & Human Rights Resource Centre <<http://www.business-humanrights.org>>
- Dyne <<http://dyne.org>>
- Edu-Factory Collective <<http://www.edu-factory.org>>
- European Coalition for Corporate Justice <<http://www.corporatejustice.org>>
- European Work Hazards Network <<http://www.ewhn.eu>>
- Greenpeace International <<http://www.greenpeace.org/electronics>>
- Hazards Magazine <<http://www.hazards.org>>
- IMF - International Metalworkers Federation <<http://www.imfmetal.org>>
- Make IT Fair <<http://makeitfair.org>>
- Maquiladora Health & Safety Support Network <<http://mhssn.igc.org>>
- Maquila Solidarity Network <<http://en.maquilasolidarity.org>>
- Peer-to-Peer Foundation <<http://p2pfoundation.net>>
- International Labour Foundation for Sustainable Development <<http://www.sustainlabour.org>>
- World Economy, Ecology & Development <<http://pcglobal.org>>
- Silicon Valley Toxics Coalition <<http://www.svtc.org>>
- Centre for Research on Multinational Corporations <<http://somo.nl>>
- Students and Scholars Against Corporate Misbehaviour <<http://sacom.hk>>
- Taiwan Environmental Action Network <<http://www.iepanet.org>>
- Toxics Link <<http://www.toxicslink.org>>

For additional contacts, see the Good Electronics Network <<http://goodelectronics.org>>.

Ted Smith:

## **Why we are „Challenging the Chip“: The Challenges of Sustainability in Electronics**

### **Abstract**

Ted Smith, co-founder of some of the first organizing efforts in the field of electronics activism, recounts the transformation of Silicon Valley from an agricultural center into the first hub of a global electronics industry and the rise of electronics activism in response to growing evidence of the industry's environmental and occupational health hazards. From their original focus on Silicon Valley, activists have broadened their effort to focus on end-of-life issues, especially through the demand for extended producer responsibility. They also address the globalization of production hazards, addressed through an „International Campaign for Responsible Technology“ that links local actors and organizations in North America, Europe, and Asia in a global effort to advance a comprehensive agenda of labor rights and environmental justice.

### **Agenda**

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### **Author**

Ted Smith

- Ted Smith is the founder of the Silicon Valley Toxics Coalition ([www.svtc.org](http://www.svtc.org)) and the International Campaign for Responsible Technology and is Chair of the Electronics TakeBack Coalition ([www.electronicstakeback.com](http://www.electronicstakeback.com)), ✉ [tsmith@igc.org](mailto:tsmith@igc.org)
- Relevant Publications: Smith, Ted, Sonnenfeld, David A., Pellow, David Naguib (Eds). *Challenging the Chip: Labor Rights and Environmental Justice in the Global Electronics Industry*. Philadelphia: Temple University Press, 2006.

## Background and History of Occupational and Environment Health Concerns

Fifty years ago, the agricultural valley south of San Francisco, California was known as the Valley of Heart's Delight because it produced such abundant fruits and vegetables. Today it is known worldwide as Silicon Valley, and the high-tech revolution that started here has transformed the world. Many of the workers who used to work in the fields picking fruit and vegetables became electronics workers, making semiconductor chips, disk drives and circuit boards for the high-tech revolution. Little did they know that they were guinea pigs in a terrible toxic experiment.

The first public indications that the electronics industry – which called itself the „clean industry“ – was in fact a hazardous industry that depended on toxic chemicals to make its products came from research by the Santa Clara Center for Occupational Safety and Health (SCCOSH), formed in the mid-1970s. SCCOSH documented occupational illness in electronics workers and published the first materials on the chemical hazards in the industry.

Alida Hernandez was one of the many fruit processing workers who were 're-invented' as a 'clean room' worker and didn't realise that she was sacrificing her health in a pattern that would soon be replicated around the world. No one ever told her that her exposure to electronics solvents at IBM's disk drive factory in San Jose, CA, would lead to her cancer. She is just one of many who have suffered dreadful diseases without realising what they had signed up for.

As the toxic troubles emerged in other parts of the US and then throughout the world, other casualties were discovered - the 'collateral damage' of the high-tech revolution. Unfortunately, there are too many stories of other electronics workers suffering similar illnesses and giving birth to children with serious birth defects. While the electronics industry has vigorously resisted comprehensive health studies of its workers, data continues to emerge connecting work in electronics factories to serious health problems for workers and their children. This is especially crucial since all around the world most electronics production workers are women of child-bearing age. Here are some examples:

- Three epidemiological studies done in the US all found high rates of miscarriages among semiconductor workers.<sup>1</sup>
- IBM maintained a 'corporate mortality file' which documented that, over a 30-year period, IBM workers with exposure to chemicals died younger and more frequently from toxic-related cancers than the national average.<sup>2</sup>
- The Scottish Health and Safety Agency conducted a health study of workers at National Semiconductor in Scotland<sup>3</sup> and found disproportionately high rates of cancer among them.
- After years of resistance, the Semiconductor Industry Association has contracted with Vanderbilt University to conduct a chip industry worker health study to assess the cancer risk to semiconductor workers. The results are expected in 2010.
- In their groundbreaking article 'Cancer and Reproductive Risks in the Semiconductor Industry', Joseph Ladou, MD, and John C Bailar III, PhD, documented the serious health concerns of semiconductor workers.

The environmental and health problems have not been limited to production workers. In 1982, with the discovery of widespread chlorinated solvent pollution in the groundwater throughout Santa Clara country (now called Silicon Valley), SCCOSH spun off a community-based organization called Silicon Valley Toxics Coalition to focus on the environmental aspects of high-tech pollution, primarily related to the production processes. More than 100 groundwater pollution sites were discovered at high-tech facilities throughout Silicon Valley and 29 of them – including IBM, Intel, Hewlett Packard, Advanced Micro Devices, National Semiconductor and other well known companies - were eventually listed by USEPA as „superfund sites“<sup>4</sup>, a classification used for the worst contamination sites in the country. Hundreds of families came forward to file lawsuits alleging that their children's birth defects and cancer were caused by drinking polluted water. Similar patterns of groundwater pollution were well documented in several other high-tech centers around the U.S., including Austin, Texas, Albuquerque, New Mexico, and Phoenix, Arizona.

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1 Ladou.

2 Clapp.

3 Hesa.

4 SVTC, Maps of Silicon Valley Groundwater Contamination.

The initial focus on groundwater pollution and cleanup evolved into a broader focus on air pollution and then pollution prevention. Some limited progress has been made to implement policies to reduce these hazards in Silicon Valley as the industry began its global expansion.

**The initial focus on Silicon Valley expands in two directions: a focus on end-of-life and a focus on the globalization of production hazards**

### A. The focus on Product End-of-Life Problems and Extended Producer Responsibility

In the 1990s, the focus on electronics and the environment began to broaden from production-related hazards to product related hazards, particularly the end-of-life challenges of disposing of millions of obsolete electronic products that contained significant quantities of hazardous materials such as lead, cadmium, mercury, brominated flame retardants, etc. The European Union developed two watershed laws – the Restriction on Hazardous Materials (RoHS) and the Waste Electronic and Electrical Equipment (WEEE) directive to reduce the hazardous materials in electronic products and to establish Extended Producer Responsibility to require electronics manufacturers to accept life cycle responsibility for their products. There were no similar initiatives in the US at the time, and in fact the US electronics industry – along with the US Trade representative – made unsuccessful attempts to block the E.U initiatives.

Activists in the U.S. were alarmed to learn about these U.S. industry efforts, and organized their own campaign that showed that producer responsibility, far from being the kind of „command and control“ regulation lambasted by US industry in the past, simply *internalizes previously externalized* costs of pollution, offers electronics companies *flexibility to innovate* in how they meet its targets for recycling and chemical phase-outs, and encourages them to *compete on grounds of design and recycling efficiency*.

#### What is Extended Producer Responsibility ?

Extended Producer Responsibility (EPR) is a policy approach that holds manufacturers accountable for the full costs of their products at every stage in their lifecycle. EPR is a strategy that requires producers

take back their products at the end of their useful lives, or pay a recycling contractor to do so, thereby internalizing the costs of recycling or disposal in a manufacturer's bottom line. When companies know that they will bear the costs of product return and recycling, they are more likely to redesign their products for easier and safer handling at each step in the lifecycle. This approach enforces a design strategy that takes into account the upstream environmental impacts inherent in the selection, mining and extraction of materials, the health and environmental impacts to workers and surrounding communities during the production process itself, and downstream impacts during use, recycling and disposal of the products. In short, by requiring a company to take its products back, EPR aims to force the company to make the products cleaner in the first place.<sup>5</sup>

#### The European Union Model and the Soul of Globalization

In the 1990s, American labor, health, and environmental non-governmental organizations (NGOs) concerned about the electronics industry's impact sought to turn the process of economic and political globalization to their advantage. Forming the *International Campaign for Responsible Technology (ICRT)* in the 1990s, NGOs that had worked mainly at the local level first built national and then international ties to share information and strategies and conduct campaigns across borders (see „From Grass Roots to Global,“ in *Challenging the Chip: Labor Rights and Environmental Justice in the Global Electronics Industry*). NGOs discovered a promising, comprehensive policy solution in EPR, as embodied in the European Union's (EU) proposed directives on electronic waste and toxics reduction. Activists recognized that by raising standards for the production and disposal of electronics in Europe, the EU directives offered the best tool for raising standards in the United States without sweeping its toxic waste under developing countries' rugs.

EPR promised to promote higher environmental and workplace safety benefits worldwide, rather than shifting risk abroad and fueling a downward spiral in standards. By requiring producers to take back their products, redesign them for easier recycling, and phase out some of the most dangerous toxics, the EU's directives sought to reduce risk at each stage

<sup>5</sup> See EPR Working Group for more information <<http://www.eprworkinggroup.org>>.

of a product's lifecycle wherever it occurred in the globalized electronics industry. Rather than exerting downward pressure on environmental and labor protections, EPR could turn globalization into a force that conditioned access to major world markets on meeting more stringent norms for design and disposal. In the era of global markets, EPR pushes transnational corporations to meet the highest standards set in any major market because it is expensive to manufacture different product lines for different regional markets. In addition, if companies were to produce more hazardous and less hazardous versions of their products for different markets, they would be opening themselves up to public and regulatory criticism (as well as potential liability) for employing an environmental double standard that poses greater risks to some customers and regions.

As a sign of the internationalization of electronics regulation and activism, the ICRT's first step in embracing EPR was to defend Europe's ability to enact it against the US government's and the industry's objections. In 1998, the *American Electronics Association (AEA)*, a major trade association, convinced the US Trade Representative (USTR) and the Mission to the European Union to fight the European directives.<sup>6</sup> The trade associations argued that mandated phase-outs of toxic materials would undermine the „functionality, safety and reliability“ of their products, and „impede the development of new technologies and products, increase costs, and restrict global trade in these products“ (*Hunter and Lopez paper for AEA, 1999*). The trade associations also alleged that requiring producers to assume financial responsibility for collecting and processing e-waste violated the General Agreement on Tariffs and Trade (GATT) rules against trade restraints. The US Mission in Brussels agreed, arguing to the EU that the directives raised „unnecessary barriers to trade, particularly the ban on certain materials, burdensome take-back requirements for end of life equipment, and mandated design standards“.

In May 1999, a group of environmental activists from Europe and the US met in Soesterberg, The Netherlands, to develop a way to defend the directives from US lobbying and to create a strategy to „get out ahead“ of the next generation of electronics problems, rather than continuing to play „catch up“ by trying to clean up the problems created by the previous generation of products. There was a keen awareness that Moore's law was driving change so quickly that governments were hopeless in their

efforts to regulate such a constantly moving target. The Soesterberg group developed a new vision of sustainability to track the dynamism of Moore's law:

*Each new generation of technical improvements in electronic products should include parallel and proportional improvements in environmental, health and safety, as well as social justice attributes.*

*Adopted by the Trans-Atlantic Network for Clean Production, May 16, 1999<sup>7</sup>*

The ICRT then wrote a legal response to the industry's claims, showing how industry had erred in arguing that the EU directives were not protected by GATT's exemptions. The ICRT also mobilized a coalition of hundreds of labor, environmental, and community organizations expressing support for the EU directives and calling on then Vice President Albert Gore to rein in the USTR's lobbying efforts. While industry cast the directives as a matter of „free trade“ versus „protectionism,“ activists used the letter to Gore to transform the debate into one about corporate responsibility, sovereignty, and democracy. Later that same year, as part of the major WTO mobilization in Seattle, the ICRT organized a protest against e-waste at Microsoft headquarters to further pressure US industry to back off in its efforts to undermine the EU directives. Microsoft was chosen not only because it was a co-host of the WTO meeting, but also because its constant software updates push demand for more processing speed and drive the pace of computer hardware's rapid obsolescence and the growth of e-waste. As a direct result of this organizing, the USTR backed down from its lobbying in Europe.

### Importing EPR into the United States

During the years 2000-2003, as approval of the EU legislation was increasingly imminent, an expanding coalition of NGOs took the lead on introducing EPR into US debates – initially called the Computer TakeBack Campaign<sup>8</sup>, it later expanded into the Electronics TakeBack Coalition. Although local and state governments, electronics recyclers, the US Environmental Protection Agency (EPA), and industry began discussing how to build an electronics recycling infrastructure and allocate recycling costs, they focused on improving practices for dealing with

<sup>6</sup> <<http://www.aeanet.org>>.

<sup>7</sup> <<http://www.cleanproduction.org/Electronics.Green.php>>

<sup>8</sup> <<http://www.electronicstakeback.com>>

products at the end of their lives. Had NGOs not advocated for an EU-style solution, the problem would have been seen simply as one of paying for managing e-waste responsibly, rather than as an opportunity to address the effects of electronics at each stage of their lifecycle.

### The Future of EPR in the United States

Producer responsibility for electronics has made impressive inroads in the United States since the late 1990s. The industry has conceded, in the words of an invitation to a recent AEA forum on regulation, that „it is clear that European environmental policy is setting a pattern for the rest of the world“<sup>9</sup>. Some of the leading producers have now accepted that they will have to incorporate the cost of handling their products at the end of their useful lives into the prices they charge US consumers. The debate is no longer about „whether“ to adopt EPR principles – it is now about „how“ to do so.

## B. The Grassroots Global Response to Electronics Production Hazards

By the dawn of the 21st century, most electronics manufacturing had moved to Asia and other low-cost areas of the world, bringing with it the same sets of environmental and health concerns that had been discovered in the US and Europe but which were at that point unknown in the new regions. Soon activists in the developing world began to encounter and uncover occupational health hazards and environmental pollution associated with the latest round of rapid expansion. Global networks of activists began to emerge to address the hidden hazards of high-tech development and they are now working to develop comprehensive, holistic and coordinated strategies to bring accountability to and promote sustainability within the global electronics industry. Included within these networks are groups that focus on workers rights, occupational health and safety, environmental pollution, and hazardous waste prevention and cleanup. Some newer voices are beginning to question the underlying model of Moore's law that promotes rapid obsolescence and the „throw away culture“ that is fueled by huge advertising budgets informed by state of the art marketing strategies as well as by young consumers

grasping for the latest gizmos and whiz bangs. Still others are beginning to examine the role of software development which operates in tandem with the hardware development – each encouraging consumers to continue to buy more complex products and discard older models. Some have dubbed this the WINTEL model, named for the 2 main oligopolies Windows (Microsoft) and Intel.

As workers and communities outside of Silicon Valley began to discover this 'dark side of the chip', they also began to come together to confront its 'clean' image. Community and worker based movements began to emerge in other countries - PHASE II in Scotland, Asia Monitor Resource Centre in Hong Kong, TAVOI in Taiwan, CEREAL in Mexico, etc. as the grassroots efforts began to grow into a global movement. Many of these groups are now working together internationally through various networks to develop worker training on occupational health and safety, to clean up and prevent air and water pollution, to press the electronics industry to phase out use of the most toxic chemicals, and to advocate for a safer, healthier and more just workplace for production workers.

As the pace of corporate-led globalisation accelerated, grass roots activists realized that they too needed to develop a robust grassroots global response. That is why many of these groups came together with the *International Campaign for Responsible Technology* to convene the first Global Symposium on Strategies for a Sustainable High-Tech Industry, in 2002, in San Jose, California. Participants came together to address several related issues, including:

- Rising community and workers' health problems.
- Deteriorating workers' rights.
- Increasing water and air pollution.
- Growing crisis of electronic waste.
- Escalating corporate influence on global institutions such as the WTO.

An action plan was developed that included a commitment by participants to pool their experiences into a new book, which became 'Challenging the Chip: Labor Rights and Environmental Justice in the Global Electronics Industry', published in 2006. Contributors to this pioneering volume include many of the world's most articulate, passionate and progressive visionaries, scholars and advocates. Here they not only document the unsustainable and often

<sup>9</sup> JIG.

devastating practices of the global electronics industry but also chronicle creative ways in which activists, government agencies and others have attempted to reform the industry -- through resistance, persuasion, and regulation.

One book reviewer captured the importance of the effort:

*'Challenging the Chip is certainly the most comprehensive review of the social, health and environmental consequences of the electronics industry to date and provides a critical platform for developing new theoretical and empirical research on the political economy and ecology of the industry. The plethora of topics explored also highlights the multiplicity of disciplines that can contribute to debates about the chip industry, including the social sciences, public health, and environmental sciences. A most impressive feature of the book is the way in which it developed out of a collaborative partnership of intellectuals and activists with a shared vision of sustainability and justice.'* - *Electronic Green Journal*<sup>10</sup>

Since the book's publication there have been many additional efforts by NGOs to move ahead with a „labor rights and environmental justice“ agenda for electronics workers and communities. ANROAV - *the Asian Network for the Rights of Occupational Accident Victims*<sup>11</sup> - has increased its focus on electronics workers' health and safety and has included panels and workshops at its last two annual meetings. *The European Work Hazards Network*<sup>12</sup> has also included electronics health and safety workshops at its conferences, as has the national *Committees on Occupational Safety and Health Network (COSH)*<sup>13</sup> in the United States. *Good Electronics*<sup>14</sup> is another network based in Europe that focuses on working conditions in electronics.

There is also growing interest in India and China, countries with the most rapid high-tech growth and consequently with the most at stake in terms of workers' rights, worker and community health, and electronic waste impacts. Following the publication

of *Challenging the Chip* there were forums held in Bangalore and Kerala, India, organised by *Asia Monitor Resource Centre*<sup>15</sup>, *Waste Not Asia*, and other labor and grassroots groups. Likewise, a book tour was arranged in China by *Greenpeace*<sup>16</sup>, which energised large groups of students and others at several campuses in south China and in Beijing. The Chinese version of the book also will be available soon. Media attention is growing throughout Asia and throughout the world – a recent presentation at an eco-waste forum in Manila was featured in an article in the *Manila Times*. And the emergence this past year of the dazzling Internet video *The Story of Stuff*<sup>17</sup> has informed and excited millions of activists around the globe.

It has been a long time since the Valley of Heart's Delight began to disappear in its transformation to Silicon Valley. Hopefully it is still not too late to learn the lessons of this experience to protect emerging 'Silicon Valleys' in India and throughout Asia. The growing grassroots global movement is increasingly speaking truth to power, putting a human face on the dark side of globalisation, and providing a vision for a new sustainable electronics industry. It is about time we learned from the lessons of the past, since the future continues to be built before our very eyes, and, as we know, it is being built on even more powerful and less understood technologies such as nano technology. Our challenges are only just beginning.

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Felipe Fonseca and Daniela de Carvalho Matielo:

## Notes from the Field:

### E-waste in Brasil - Lixo Eletrônico and MetaReciclagem

#### Abstract

As probably every other country in the world, in recent years Brazil has seen an immense increase in the production and consumption of electro-electronics equipment, which generates, as expected, an equally large amount of e-waste. However, there is a general lack of information about health and environmental issues among actors involved with the e-waste cycle, and very limited public discussion about the topic. Also, proper legislation to regulate the destination of all this material does not yet exist. The National Policy on Solid Residuals, which has been discussed in the Brazilian Congress since 1991, had shown signs of including e-waste management. But the responsible working group in the Chamber of Deputies has recently decided to make an amendment to its 33rd article, dealing with the regulation of reverse logistics (take-back) and mandatory recycling of special waste, and no longer considering electronic equipment as such. In response to that, the collective Lixo Eletrônico decided to publish a manifesto and open an online petition drawing attention to the change in the bill. The article offers an overview of the situation and the issues involved and explains the action that is being carried out by the Lixo Eletrônico Collective, presenting the first outcomes and next steps.

#### Agenda

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## 1. The Lixo Eletrônico Collective and the Brazilian Context

The Lixo Eletrônico<sup>1</sup> collective evolved from a perceived need to open up the public debate about e-waste in Brazil. Its weblog was created following the release of a study on e-waste management in the country, commissioned by the Dutch organisation Waste.nl and carried out by members of the MetaReciclagem network.<sup>2</sup> The results of the study revealed several critical issues regarding e-waste management:

- the existence of a local market that relies on small-scale cooperative recycling businesses and the informal handling of electronics, which are usually discarded with the normal trash and end up in landfills;

the small amount of information available in this e-waste market regarding proper safety and environmental measures for managing and recycling e-waste; among the few specialized recycling companies, the complexity of a proper full-cycle solution for the materials, being often necessary to export the waste to be handled in other countries which have proper recycling plants, thus making the whole process more expensive;

- the absence of a legislation that regulates the discard of e-waste and poses rules for an environmentally sound management.

Regarding the legal framework, Brazil is a signatory to the Basel Convention, which states that hazardous waste should be managed as closely as possible to the source of generation, but it lacks proper national legislation to deal with the issue. The National Policy on Solid Residuals has been in discussion in the Brazilian Chamber of Deputies since 1991, but has not yet been approved. The bill addresses all types of solid waste and regulates the disposal of these materials. Although included in the original draft, electronic waste was exempted from this regulation. It was in this context that the Lixo Eletrônico website was launched in September 2008, aiming to open the debate about e-waste to general

discussion and proposing a model which encompasses the social, environmental and economic issues related to e-waste management.

## 2. Developing a Local Model for E-waste Management

Being informed of and in contact with projects from all over the world while keeping an eye on the local context, the Lixo Eletrônico collective is developing a model for e-waste management that responds both to a global issue and to local specifics. Its guidelines were outlined in a series of articles called „The e-waste life-cycle“ which were published in the Lixo Eletrônico blog, and consist in a threefold action strategy: production/consume, disposal/reuse, and recycling<sup>3</sup>. Each of these axes involves several complex questions.

Production/consume is seen as a continuum, in which both consumers and manufacturers influence and affect each other's decisions. In that sense, not only the industry but also the media and the consumers are responsible for the ever growing sensation of obsolescence of technological devices. To fight that trend, Lixo Eletrônico recommends (and adopts) measures in three perspectives: foster the responsible consumption by gathering and publishing information about the manufacturing processes and other practices of the industry, as well as helping to increase awareness of related publications such as Greenpeace's Guide to Greener Electronics; stimulate the reuse of electronics by showing ways to extend the life span of technologies using alternative strategies such as adoption of free software and repurposing hardware (e.g. using an old computer as a file server or firewall); and provide information about how to discard electronics in an environmentally sound manner.

While Brazil has been increasingly integrating into a globalized economy, there is still a huge gap in terms of access to information technologies. For that reason, rather than adopting the perspective that every discarded electronic device should be directly sent to recycling, Lixo Eletrônico contends that every potential use of electronic devices should be attempted before such devices are sent to final disposal. Some of the founders of Lixo Eletrônico have also been acting as key members of the MetaReciclagem network, which in a more local, de-

1 [lixoeletronico.org](http://lixoeletronico.org)

2 da Silva, Martins, & Oliveira 2007. A small-scale governmental reuse effort exists, see [www.computadoresparainclusao.gov.br](http://www.computadoresparainclusao.gov.br)

3 Fonseca 2008.

centralised fashion has encouraged a great deal of experimentation regarding the critical reappropriation of information technologies for social change, either by reassembling computers or repurposing them in initiatives related to education, art or craftsmanship.

Building on this experience, Lixo Eletrônico proposes a model in which local nodes (social organisations, small-scale, cooperative businesses and the like) develop knowledge related to the repair, reuse and disassembly of electronics, and start acting as a network that operates receiving electronics, making them work again (as electronics or otherwise) and delivering them to social projects, as well as forwarding the unusable parts to proper recycling facilities. The best way to achieve scale for the network without losing autonomy would be to establish the bases for a distributed logistics network, a non-financial, self-organised auction system in which people could offer their electronics for donation and interested organisations and projects would be able to receive these donations.

The recycling business usually relies on regulations that (as mentioned above) are not currently available in Brazil. Even if that wasn't the case, e-waste recycling is a rather complex issue: unlike common examples as PET bottles or tin cans, for which a fairly well-developed recycling industry exists in Brazil, the proper recycling of electronics requires the separation of materials, which poses a difficult challenge: every electronic device is composed of dozens of different materials, all of them welded one into the other. The separation requires the use of machinery not widely available. In fact, Lixo Eletrônico has learnt that a great number of Brazilian companies which claim to properly recycle electronics usually adopt all kinds of questionable practices. The most common one is to tear up the equipment to extract the very small amount of expensive materials - gold, silver - and then put all that is left in containers which are sold to unlicensed operations in places like China, Ghana, India and others. More often than not, these materials will be processed with no attention to environmental, labour or social regulations, and will likely end up in a landfill somewhere else in the world.

As long as adequate recycling processes and technologies are not in place, the sector makes a high profit by acting irresponsibly. Because the recycling of electronic materials as a whole (including every part of electronic devices) in the current state of technological development is hardly sustainable, legal mechanisms ought to be established to fund

those activities. Given the need for proper legislation that addresses the issue of e-waste management, the bill on the National Policy of Solid Residuals, which has been under discussion in the Congress for more than 15 years, could be a response to this need. Unfortunately, recent changes to the proposed policy suggest that this will not be the case.

### 3. The Electronic Waste Manifesto

Over the summer of 2009, the bill on the National Policy of Solid Residuals started moving again inside the Brazilian Chamber of Deputies. However, for no apparent reason, the responsible working group has decided to make an amendment to its 33rd article, dealing with the regulation of reverse logistics (take-back) and mandatory recycling of special waste, no longer considering electronic equipment as such. There was no official explanation for the change, but a few groups and NGOs involved with the theme of e-waste management implied that it had been done because of the pressure of the Brazilian Association of Electric and Electronics Industry (ABINEE).

In response to this move, Lixo Eletrônico decided to publish a manifesto and open an online petition drawing attention to this change in the bill:

#### **ELECTRONIC WASTE MANIFESTO FOR THE INCLUSION OF ELECTRONICS IN THE NATIONAL POLICY OF SOLID RESIDUALS**

*Let's pressure the Chamber of Deputies to reinstate electronics into the amended 33th article of the National Policy of Solid Residuals dealing with reverse logistics (take-back) and mandatory recycling of special materials.*

*There are approximately 160 million cell phones and 60 million computers currently in use in Brazil. The prediction for 2012 is that there will be an estimated amount of 100 million computers, one for every 2 people in the country. In 2008, the income of electronics market reached R\$ 123 billion (about US\$ 61.5 million), having been growing since 2002. Electronic devices can make companies more competitive, make people's lives easier, offer leisure and entertainment, and are an important tool for individual and social development.*

*On the other hand, electronic equipment produces toxic waste in great amounts and has complex recycling processes. According to studies on the risks for the environment and people's health carried*

out by the Brazilian commission of the UNEP (United Nations Environment Programme), most of these products contain toxic substances like anti-flame polymers, plastics, heavy metals like mercury, lead and cadmium.

In addition to contaminating the environment, such substances may cause severe damage to the health of people and animals, causing failures in kidney, lungs and brain that compromise the entire nervous system. It is a growing issue and many countries already have specific legislations to deal with it. The European Union, for instance, has regulated a policy on the Electronic Residuals by the Environmental European Commission; and USA has many laws by the US Environmental Protection Agency as well as specific legislation from e.g. New York and California states.

In Brazil, we have an opportunity that is being literally wasted. A bill regarding a National Policy for Solid Residuals (PL 203/91) has been discussed since 1991 in Brazilian Congress. It is imperative that such policy contemplates electronic equipment and frames it as a special product for mandatory recycling and take-back.

Electronics are increasingly becoming part of our lives, bringing benefits at the same rate as they produce waste at a pace we cannot currently deal with. Regulating and specifying its destination is an urgent and necessary condition for us to keep on benefiting from technological advances in a sustainable fashion, without the environment and human health paying a higher price.

In addition to releasing the manifesto and the petition, Lixo Eletrônico also used mailing lists, social networks and microblogging tools to spread the word about the situation. Within one month, the petition had been signed by over a thousand people and was featured in major media channels. Even more important, the assistants of three of the congressmen who are part of the working group contacted Lixo Eletrônico. One of them offered some information regarding the removal of electronic waste from the bill, while the other two thanked the collective for making the debate public, and mentioned that it would help them bring the subject back to the legislative discussion.

## 4. Next Steps: Amplifying the Discussion

Lixo Eletrônico will keep the petition open until the final voting of the National Policy of Solid Residuals in the Brazilian Congress. Still, besides the existence of a proper legislation there must be ways to monitor those activities and to draw public attention to the consequences social, environmental, economic - of the development of IT and electronic devices.

With the aim of sharing information, experiences and perspectives about how the issue is being dealt with in other parts of the world, the Lixo Eletrônico collective, together with the Obsoletos.org project from Spain, and the MetaReciclagem Network, has organized a working group for the IV Congress of Cybersociety (2009)<sup>4</sup>.

The Congress is an international event with a very broad and interdisciplinary focus. It has been organized by the Observatorio de la CiberSociedad since 2002 and brings together researchers and practitioners to discuss how the development and use of technology relates to education and learning, communication, politics and participation, culture and identity, security and every other aspect of our daily lives, which are being permeated by the use of technologies. Even though an important effect of the increasing use of technology is the amount of e-waste that is being generated in the world, 2009 is the first time the Congress in which a working group is specifically addressing the topic. The aim of promoting the discussion in an event such as the Congress of Cybersociety is to raise awareness about the fact that e-waste management is not only a matter of disposal logistics but entails social, environmental, political and economical trends.

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<sup>4</sup> [www.cibersociedad.net/congres2009/](http://www.cibersociedad.net/congres2009/)

Ugo Vallauri

## Beyond E-waste: Kenyan Creativity and Alternative Narratives in the Dialectic of End-of-Life

### Abstract:

The main focus of green IT campaigns and policy interventions in developing regions has been on efforts to counter the flows of e-waste coming from the West. This paper argues that while such interventions are necessary, they often fail to acknowledge the complexity of information-technological developments across the global South. Complementary narratives can uncover a more nuanced perception of the role played by second hand ICT equipment in development. E-waste is at first contextualized within the wider debate on the contested role of technology in post-development. Examples of the multi-dimensional role of technology in development initiatives in Kenya are used to provide evidence of existing cultures of reuse and of their potential to inform and influence a shift in Western ICT consumption patterns, in line with contemporary debates on de-growth. Examples of alternative approaches to development in the context of ICT abound, and it's key to focus on those that have roots in the creation of value right where others would see only waste – translating the ethos of the grey economy in projects that reclaim economical and educational spaces.

### Agenda

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Recent campaigns from organizations such as Greenpeace and MakeITfair have greatly contributed to increasing awareness on the environmental risks associated with the end of life of ICT equipment, the poor working conditions in the IT industry, and the serious environmental and human consequences of the multiplication of electronic gadgets in everyday life.<sup>1</sup> As a result, in particular the discussion around e-waste has grown within both the academic and the ICT4D practitioners' community. Together with the debate came a strong and consistent visual imagery usually combining piles of dusty, old and malfunctioning desktop personal computers (PCs) in rural schools with footage of burning circuitry from discarded CRT screens in urban and peri-urban Sub-Saharan Africa – brilliantly exemplified by a recent Frontline PBS (2009) documentary covering the topic. The popularization of this imagery has supported reflections on the relationship between the previously disconnected geographies of IT production, consumption, and disposal. In several African countries, such criticism has already resulted in policies either completely blocking the import of second-hand IT products, as in Uganda from 2009, or severely discouraging it, as in Kenya, where the government introduced in the 2008 Budget a 25% excise duty on all used personal computers coming from outside East Africa. Other countries, such as Zambia and Nigeria, are considering similar measures. Such decisions can partially be linked to the active lobbying of local firms and international IT corporations interested in expanding their presence in the new commercial frontiers of the *emerging markets* - especially at a time of progressive saturation and recession in the Western markets.<sup>2</sup> However, these measures also clearly indicate a growing negative perception of used electronics and in particular of refurbished PCs among African policy-makers.

## 1. Post-Development, De-Growth and ICT

The issue at stake is not the obvious ethical unacceptability of the illegal trade and dumping of electronic waste into countries such as China, Ghana, India, Nigeria, or Hong Kong, but instead whether the dominant e-waste-discourse on environment

and ICT fails to explore and acknowledge other, more diversified perspectives on the use of second-hand electronic products in developing countries. But rather than contesting the validity of existing e-waste campaigns, I make the case for the consideration of a range of other narratives that take into account not only the environmental risks but also the promising opportunities associated with the full inclusion of the South in the global information society. Mapping the multi-dimensional and controversial aspects of the reuse and the recycling of IT products in developing countries is a necessary element in assessing the global ecological sustainability of ICT for development.

This need to explore alternative narratives resonates with work in the post-development tradition, briefly explored here by way of engaging Serge Latouche's most recent work. Latouche focuses on the concept of de-growth (more widely known as the French "decroissance") as the concept has proved popular in inspiring new social movements in France and Italy.<sup>3</sup> With de-growth, Latouche takes the post-developmental critique a step forward, challenging Western societies to learn to *de-grow* from excessive consumption, GDP-driven policies, and lifestyles based on environmental degradation – a vision in line with the green IT campaigns to "use, reuse and only eventually recycle" of Western IT charities.

The use of de-growth in the context of ICT is extremely rare, apart from Schauer (2008), who focuses on the risks of the rebound effect, in particular on the contradictions between material de-growth supposedly facilitated by ICT with the progressive digitalization of all artifacts and the increased ecological footprint caused by low prices of ICT equipment and consequent high diffusion of all sorts of devices. Such a multiplication of devices is at the heart of Latouche's own critical position on technologies in the context of development – first of all in regards to current trends of introduction and transfer of new technologies, which distract from and hinder locally determined self-development strategies. This accusation of a sort of "techno-colonialism" is common in post-development thought, and it refers to the imposition on developing regions of new technological solutions, designed with aims and objectives not necessarily in line with those of the regions they are pushed to. But even more importantly in this context, Latouche also condemns African "second-hand consumption societies" made of Western waste such as unserviceable

<sup>1</sup> for example, Norbrand, 2009, video and leaflets on [makeit-fair.org](http://makeit-fair.org)

<sup>2</sup> Cisler, 2005

<sup>3</sup> Latouche 2007, 2008

mobile phones, recuperated personal computers and the likes. But by doing so, Latouche fails to acknowledge the values of informal African economies based on repair, reuse, adaptation and creativity – paradoxically a theme at the very essence of the de-growth he envisions for the West.

## 2. The Grey Economy of the Information Society

Ravi Sundaram has offered a different approach, taking into consideration the fertile ground of the informal economies of Indian ICT. In *Recycling Modernity* (1999), Sundaram already criticizes the neoliberal vision of India as an homogenous technospace, one where all that matters is the “young, upper-caste, often English-speaking programmers in large metropolises, particularly emerging techno-cities like Bangalore and Hyderabad”. But Sundaram's analysis, far from being an hymn to a nationalist rejection of new media technologies, goes well beyond a critique of the cyberlibertarian ideology of new economy hubs in developing regions – it points to the “grey economy” of hardware reuse and recycling as well as of software pirating, a flexible practice of survival for those excluded from the techno-elite, contributing in urban and rural areas alike to lowering costs of access and re-appropriation of the information society. The aspects of survival and of extreme necessity linked to the grey economy are critical in explaining it as a form of resistance to the global market dynamics of ICT diffusion, clearly in opposition with a simple fascination for digital tinkering, typical of the cyber-elites.

Even ten years after these reflections on the multiple levels of engagement of the Indian society with ICT, a new version of the same developmentalist ideology currently dominates ICT-debates in Kenya. Neither the Kenyan government nor major development agencies reflect positively on the demands of the grey economy and on the needs of the most marginalized groups. Instead, at a time when the completion of the first undersea fibre optic cable is finally bringing broadband to the region, the Kenyan government's ICT Board (2009) is attempting to brand the country as the ultimate Business Process Outsourcing (BPO) destination, a sort of “ultimate India” engaging with the infinite capitalist struggle for the cheapest labour. Yet despite policy responses to e-waste (the new excise duty on used IT-imports), today's Kenya can't do without used electronics.

## 3. ICT4D in Kenya

Examples of alternative approaches to development in the context of ICT abound, and it's key to focus on those that have roots in the creation of value right where others would see only waste – translating the ethos of the grey economy in projects that reclaim economical and educational spaces well beyond anecdotal evidence, offering a sustainable alternative to top-down approaches of technology transfer.

### Second-hand PCs and the education sector

Computers for Schools Kenya (CFSK, [www.cfsk.org](http://www.cfsk.org)), a Kenyan NGO providing Kenyan secondary schools with access to computer labs fitted with refurbished PCs, suggests a different narrative for the environmental problematic linked to ICT4D. Apart from the actual computers, CFSK provides ICT training for teachers and assistance in the periodic maintenance of the IT equipment supplied. Over the past few years, CFSK has distributed over 10,000 PCs to more than 400 secondary schools within Kenya, much more than the Ministry of Education itself has achieved, whether with new or refurbished PCs, and at a much lower cost per seat. As part of its activities, CFSK provides schools with a concrete solution for the substitution of the deployed refurbished PCs at the end of their life-cycle with newer refurbished PCs, and only installs hardware when proper facilities exist in the school, such as an appropriate classroom, security, equipment to limit risks deriving from power failures – a major problem for maintenance of both brand new and second-hand PCs in Kenya. CFSK procures its PCs both locally, through corporate social responsibility programmes of local and international companies, and internationally, through donations from IT charities, such as Computer Aid. On top of that, CFSK is a local innovator, not only because it manages to extend the life of its PCs, but more importantly because their technicians have developed a method to give a new, “third life” to malfunctioning second-hand CRT monitors, by re-engineering them into low-cost television sets. CFSK is directly involved with handling obsolete and no-longer working PCs, and has recently established an e-waste management centre, to locally recycle components whenever possible, and ship the rest out of the country for environmentally sound recycling.



### End of life and planned obsolescence

The example of CFSK also addresses another aspect of the link between information technology and the environment: the question of what is indeed the end-of-life of a product. The concept of planned obsolescence can help in shedding light on how a product is perceived as obsolete and as such loses its trading and use value.<sup>4</sup> The case of the computer industry is a classic example. Computer processor designers are busy with the next generation even before starting distributing the current one. Software engineers, especially in the proprietary software world, don't feel compelled by the limitations of most consumers' hardware in coding their products. As a result, computers and other electronic devices' life-span is constantly artificially reduced, while new needs emerge as fabrications of marketing strategists. However, different groups of users redefine what's useful to them in resisting opposition to market logic. This autonomous way of making use of the existing resources and of adapting them to specific needs resonates well not just with a common sense desire to reduce, reuse and recycle, but also with studies highlighting how the most energy-intensive aspects of computing lie within the manufacturing process, and that therefore extending the life-span of existing computers is the most environmentally friendly option, and should be pursued at all levels<sup>5</sup>. The Kenyan government's decision to introduce an excise duty on the importation of second-hand computers in 2008, however, had a severely negative impact on the activities of organizations such as CFSK; the new excise duty is also an inadequate measure to tackle and regulate the electronic waste already existing in the country.

### Mobile creativity in the informal sector

The interaction between an extended life-span, wider access to technology, and local innovation provides further evidence for reconsidering the role of used electronics. One example is that of the Kenyan M-Pesa service, the first successful wide-scale implementation of a mobile payment system in Africa, ahead of many yet to come implementation in more "developed" countries.<sup>6</sup> The story of M-Pesa is peculiar because it is a technology requiring very basic mobile phones for the end users, as all money

transfers are completed simply via SMS.<sup>7</sup> This doesn't only imply that the technology is open to all literate mobile phone owners, but also more significantly that by being compatible with the lowest common denominator of mobile devices, "old" but reliable technology, M-Pesa has quickly become relevant to millions of Kenyans - almost 7 million users are currently registered to the service, out of 35 million inhabitants - including those relying on a second or third-hand or refurbished mobile phone. This is the kind of "pro-poor" innovation fostered by technology research and adoption in developing regions, which Heeks (2008) refers to as the engine of a new wave of more effective ICT4D 2.0. By providing an easy way to distribute micro-payments across urban and rural areas alike, M-Pesa facilitates the growth of economic and social opportunities to under-served communities, while at the same time reducing needs for travelling across the country to transfer money to otherwise "unbanked" citizens - ironically, a sort of technologically-caused de-growth.

By focusing exclusively on 'broken' mobile phones in Africa, Latouche fails to capture that in Kenya, like everywhere else on the continent, mobile phones literally *never* die, because of the technical expertise of thousands of meticulous workers constantly dismantling phones, studying circuit by circuit, re-adapting spare parts, never giving up until they learn how to fix the handset or to unlock it. But this creativity goes further: modified phones with dual SIM cards, helping to cope with poor network coverage or high interconnection fees, solar or car battery-powered mobile chargers for area not yet covered by mains electricity - the list of opportunities sought after by *jua cali* entrepreneurs is endless, in a constant form of struggle for the appropriation of a technology designed elsewhere and originally with the devices' planned obsolescence in mind.<sup>8</sup>

## 4. Conclusion

While it is correct to demystify the dominating hype surrounding the diffusion of ICT in developing regions around the world, it would also be short-sighted to underestimate the positive excitement generated by technology introduction in education,

<sup>4</sup> London, 1932 and Slade, 2006

<sup>5</sup> Williams, 2004

<sup>6</sup> mobile money in Swahili

<sup>7</sup> Hughes and Lonie, 2007

<sup>8</sup> 'hot sun' in Swahili, it refers to thriving informal sector

agriculture and every day life, and how this "magic" element can often result in surprising "unintended consequences"<sup>9</sup>. A secondary school in Maasai Land, a semiarid rural area in the South of Kenya near the border with Tanzania, received in 2006 refurbished computers to equip a laboratory, but didn't at the time have access to electricity. This could at first be read as a classic example of a solution looking for a problem: discarding used computers to a place where they cannot be of any use. And yet, within a few months, the tangible excitement generated by the availability of computers in the local community was successfully used to lobby the local authorities to extend rural electricity to reach the school. As a result, not only the students were given the opportunity to learn basic computer skills, but – perhaps more importantly – they were also finally able to read and study after sunset.

Despite the ecological and economic constraints in which they are inscribed, African cultures of reuse and continuous adaptation and local innovation are a powerful alternative narrative tool addressing not just the ICT world, but consumer society as a whole. The understanding and appreciation of this different approach towards all waste and in particular unnecessary e-waste is critical in formulating a global ethical discourse on the multiple dimensions of the sustainable information society. The debates on the final destination of electronic waste are broadened and contextualized by such a concurrent analysis of the mechanisms behind the planned obsolescence of products, and of existing practices across the globe that can feed into visions of 'ge-growth' and sustainable forms of technological reappropriation that break this cycle. The patterns of infinite reuse and recreation of value without material production employed by Kenyan individuals and organizations offer powerful examples of what the de-growth means in the context of the information society. At a time when the system of global capitalism is showing its limits like never before, translating these inspiring examples into practices of more critical ICT consumption can help citizens and governments of developed and developing countries alike to reconfigure the myth of the global information society into more acceptable, just and sustainable terms.

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<sup>9</sup> Ali and Bailur, 2007

Raquel Rennó:

## Dejetos Materiais e Informacionais como Elementos Culturais

### Abstract

To reflect on waste is to think of it beyond cycles of consumption, as an integral element of cultural processes. The essay broadens the analysis of waste to speak of cultural remainders in a more comprehensive sense, including populations that exist (and have to subsist) at the margins of the official city, often through acts of reappropriation generally considered piracy. Such reappropriation is central to the informal economies whose control evades the cybernetic approaches to governance, and whose cultural logic offers a counter-rationality to dominant processes of consumption. Piracy is a strong element of informal economies, and its mode of production and distribution operates through fragmentation, occurring in the interstices of the city or in an ephemeral manner in order to escape surveillance. Strategies of evasion and the fluidity of the market of illegal goods, the ephemeral appropriation of space by street peddlers, by garbage collectors and inhabitants of residual spaces offers a broader view of a dynamic of info-technological recodification that is not restricted to groups of tactical media, political activists, or the terrain of digital media such as Internet and mobile telephony.

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- Do Mármore ao Vidro: mercados públicos e supermercados, curva e reta sobre a cidade? (Sao Paulo: Annablume, 2006)
- Non\_sensor (Proceedings of the 13th annual ACM international conference on Multimedia, 2005)

## Dejetos e a Teoria da Informação

Os distintos modos de se apropriar da informação e objetos residuais demandam uma intensa capacidade de adaptação e de criação de novos sistemas de linguagem. Abordar os dejetos ou „aquilo que sobra” nos obriga a combinar diversos níveis de sistemas comunicacionais que vão do espaço físico propriamente dito, grupos sociais excluídos pelo poder público e privado, os resíduos deixados pelas ruas (dentro e fora das lixeiras) e que vão sendo reorganizados pelos moradores dos espaços residuais e utilizados na construção de casas, no comércio de material reciclado, até níveis que envolvem resíduos comunicacionais, fonte dos moradores de favela que fazem o *gato*, a gambiarra<sup>1</sup>, desviando o curso previsto dos fluxos operantes na cidade. O próprio trabalho de pesquisa para analisar estes fenômenos envolve a coleta e a combinação de elementos aparentemente distantes, fazendo uso de teorias que devem combinar o novo, revisando o que já foi estabelecido, sem poder pertencer a nenhuma estrutura rígida ou previamente estabelecida em sua completude.

Dentro da tradição da Teoria da Informação, Wiener<sup>2</sup> pautou a teoria cibernética na idéia de controle; o nome cibernética vem da palavra grega *kubernetes*, que significa piloto. Nesse sentido, tanto seres vivos quanto máquinas lutavam constantemente contra a tendência à entropia. Para ele a informação deveria ser medida pela capacidade que havia na transmissão de vencer a tendência natural à entropia, isto é, à dispersão da energia (e de informação). Wiener sabia do paradoxo que isso impunha, já que a informação de maior rapidez de compreensão (de menor dispersão) e de menor complexidade carrega menor taxa informativa. Mesmo pontuando que a entropia não pode ser considerada *a priori* como algo negativo, citando o exemplo da dispersão da energia solar como possibilitadora da existência da vida na Terra, a visão ainda era de um sistema de *input* e *output* (e conseqüente *feedback*) onde o dentro e fora do sistema estavam bem definidos. Ele apontava que a informação era o modo de permutar com o mundo

exterior e se adaptar a ele, mas foi apenas a partir do trabalho de Maturana e Varela que se propõe a idéia de mundo exterior como algo não homogêneo e dependente das possibilidades de compreensão e percepção de cada ser vivo, assim como as trocas entre organismo e sistema alteram ambos. A dispersão da informação é parte da troca, e elementos que antes poderiam ser considerados não-participes de um sistema (resíduos) são apropriados por outros, reconstruindo estruturas, assumindo novas funções e em muitos casos alimentando posteriormente o próprio sistema de onde foram excluídos. Wiener sabia que a flexibilidade em adaptar-se às alterações no ambiente permite a expansão de organismos vivos e, conseqüentemente deveria servir de modelo para as máquinas a serem desenvolvidas. Sendo assim, não se pode confundir a teoria do controle como mero fator de regulação, mas sim um elemento que possibilitaria a aprendizagem ao alterar sistemas de desempenho.

A idéia de resíduo, de dejetos tem a ver com o ruído, algo que está fora de um sistema codificado. Quanto mais energia se produz, mais fragmentos são gerados. Deste modo, a medida da entropia é um modo de se mensurar também o nível de produção de energia. Mais que isso, a maior capacidade de absorção do ruído é um fator que possibilita a complexificação de um sistema. Essa tarefa demanda ainda mais energia e conseqüentemente, maior a entropia.

Dentro de um sistema social muitas vezes o que se considera residual é associado a algo fora de lugar, fora da norma, algo que não pertence mais a uma estrutura e que está disponível para reutilização. Apropriar-se de informação, espaços e objetos que surgem aleatoriamente tem a ver com a capacidade de adaptação de um indivíduo ou grupo, ainda que essa adaptabilidade seja por vezes fruto de uma situação de emergência e carência extremas. É um trabalho subversivo ou da *contra-racionalidade* como propõe Santos, porque está na contramão do processo homogêneo de consumo. Não segue as normas previstas „de cima para baixo”. Ao mesmo tempo, por não pertencer mais a nenhum sistema organizado é instável, móvel, um incômodo na cidade. Uma situação de potencialidade e instabilidade, mas também de disponibilidade.

## Resíduos e Sociedade

A possibilidade de transformação na cultura se dá pelo choque entre elementos de sistemas distantes e pela incorporação ou reincorporação do residual,

<sup>1</sup> Termo que deixa de designar apenas a rampa de luzes no palco e passa a significar no Brasil serviço elétrico malfeito, improvisado, especialmente com a finalidade de obter energia elétrica de maneira ilegal.

<sup>2</sup> Proposta desenvolvida no decorrer do livro *Cibernética e Sociedade*. São Paulo: Cultrix, 1993.

gerando um mosaico, um conjunto complexo que evidencia novos usos de vários elementos. Esse processo é claramente mais complexo e possível em culturas do excesso, onde a combinação de elementos múltiplos e distintos é parte do mecanismo de construção de sistemas. O conforto traria uma certeza de uma permanência simbólica que os excluídos não possuem.

É preciso compreender em que medida a residualidade gerada pela constante exclusão e ignorância em relação ao reaproveitamento de materiais e organização dos grupos sociais periféricos é um processo que impede que se crie a necessária elasticidade cognitiva da qual se beneficiariam tanto „excluídos” quanto „excludentes”. Tampouco serviria cair em diferenciações das „minorias” ou de grupos „menos favorecidos” como um modo de conhecimento que não reconhece.

Os movimentos na sociedade que buscam excluir os economicamente menos favorecidos, os imigrantes ou quaisquer grupos que não sejam considerados parte da sociedade chamada „oficial” (que são tratados como dejetos e que ao mesmo tempo trabalham diretamente com a coleta e reciclagem informal do lixo), criam não somente um problema a estas pessoas que se vêem incapazes de se integrarem, mas implicam também na alienação do grupo que exclui. Não se trata de evitar a construção dos resíduos, o que seria impossível. Trata-se de tomar consciência do processo de criação do lixo para que ele possa ser recuperado de modo criativo e não seja somente fruto de um ciclo de consumo, mas da cultura. Flusser<sup>3</sup> diz que a história humana não é uma linha linear que vai da natureza em direção à cultura, „mas um círculo que gira da natureza à cultura, da cultura ao lixo, do lixo à natureza e assim por diante”. Por isso falar de dejetos é retomar na análise um elemento que é parte dos processos culturais.

Desta forma, há a coexistência da aceleração do capital mas que ao mesmo tempo encontra no espaço local e virtual tanto seu modo de concretude quanto sua resistência. O espaço torna-se um objeto de consumo descartável, mas também é apropriado e reconfigurado por aqueles que não podem participar de seu consumo. Os modos como os sem-teto, favelados (no caso dos resíduos físico) e os hackers e ciberativistas (no caso dos resíduos informacionais) transitam pelo espaço são também possi-

dores de uma fragmentação e possibilidade de adaptação que põem em xeque as estratégias velozes de ocupação do capital. Se há o resíduo artificialmente criado pelo „ciclo de vida do produto” em Marketing, e os discursos lineares e „eficientes” da publicidade, há os resíduos culturais produzidos por sociedades onde o excesso e a grande quantidade de combinações possíveis nos processos culturais são responsáveis pelas apropriações tanto dos „restos obsoletos” do mercado quanto dos resíduos imateriais que o contato entre sistemas distantes oferece. Este processo cria possibilidades de vida emergentes com resultados estéticos que sobrepõem o âmbito artístico, combinando o uso do espaço com meios tecnológicos, comunidades residuais com grupos de mídia tática, a gambiarra de luz com os *warchalkers*<sup>4</sup>. Estas apropriações são exemplos flagrantes do uso da tecnologia de um modo subversivo, não associadas a um elemento elitista e invariavelmente conectado ao mercado que lança os „melhores e mais potentes” com cada vez maior rapidez.

A apropriação dos dejetos por parte dos migrantes, imigrantes ou outros grupos sociais que não encontram seu espaço na cidade racional encobre questões que vão muito além das fragilidades econômicas e legais que enfrentam. Resíduos geográficos, materiais, possuem um valor simbólico que tem a ver com uma resistência à lógica de consumo e ordenação. A miséria, a falta de apoio, tornam mesmo os indivíduos que estão à margem do sistema tradicional de consumo produtores em potencial, que têm de apreender o espaço e seu entorno para daí tirar o que necessitam. Seu deslocamento constante torna essa capacidade de adaptação a contextos distintos ainda mais urgente e aguçada. Por não possuírem „direito à cidade” estão, como apontado anteriormente, à margem do tempo compartimentado, estruturado. Recolhem e recuperam pouco a pouco o lixo que vêem espalhados pelas ruas, nos depósitos de lixo ou mesmo nos sacos de lixo, que são abertos e separados por eles.

## Sobre Reciclagem

Nas últimas décadas, o conceito de reciclagem tem se tornado uma preocupação, ainda que as ações efetivas nesse sentido sejam menos efetivas do que se propõe. Por um lado, a cidade „oficial” continua

<sup>3</sup> FLUSSER, Vilém. *O mundo codificado*. Trad. Raquel Abi-Samara. Sao Paulo: Cosac e Naify, 2007, pp-60-61

<sup>4</sup> Grupos que se organizam para detectar e informar locais onde há conexão de Internet sem senha para acesso que esteja disponível à apropriação.

gerando mais lixo, seja entre os habitantes ou nas indústrias, os maiores produtores de detritos tóxicos. Enquanto países como Estados Unidos relutam em se comprometer ativamente em reduzir a poluição e o lixo (ainda que seja um dos maiores produtores mundiais nessa área), países da Europa central transferem suas indústrias consideradas de alto risco e muito poluidoras para países economicamente de Terceiro Mundo, que não somente as recebe como ainda disputam entre si o direito a possuí-las em seu território.<sup>5</sup>

Em São Paulo o lixo que se coleta de modo seletivo e que pode ser reciclado não passa de 4% do total. Ainda assim, o trabalho de reciclagem (principalmente de alumínio) no Brasil é alto, devido à formação de cooperativas com boa gestão, ao alto valor do material como sucata, ao trabalho de catadores de lixo e ao comércio informal de reciclagem já que sua subsistência provém em grande parte da mesma fonte: o lixo. Um levantamento realizado pelo setor mostra que entre 2000 e 2005 a participação de condomínios e clubes na coleta de latas usadas passou de 10% para 24%. As latas de alumínio se tornaram o carro-chefe da reciclagem no país. O Brasil é há 5 anos o líder mundial em reciclagem de alumínio (96,2%, segundo a ABAL - Associação Brasileira do Alumínio).

No momento em que a reciclagem de alguns materiais começa a adquirir valor comercial, representa uma possibilidade de renda para os moradores de favelas e espaços residuais na América Latina e África. Este processo, no entanto, não possui o *status* glorificado que se observa em documentários educativos sobre a importância de se diminuir e reaproveitar o lixo. Constitui um trabalho quase ilegal, sem nenhum tipo de direito trabalhista e de alto risco.<sup>6</sup>

<sup>5</sup> Uma das disputas atuais mais comentadas é a que se estabeleceu entre Argentina e Uruguai, que envolveu desde manifestações populares até conflitos diplomáticos, para decidir que país acolheria uma fábrica de celulose de capital espanhol em áreas próximas ao rio de La Plata, que divide os dois países.

[www.cpcmercursos.gov.ar/cpcprensa/2006/2006-12/20061215.htm](http://www.cpcmercursos.gov.ar/cpcprensa/2006/2006-12/20061215.htm)

[www.elcorreo.eu.org/esp/article.php3?id\\_article=6669](http://www.elcorreo.eu.org/esp/article.php3?id_article=6669)

<sup>6</sup> *Folha de S. Paulo*, 22/9/2005: „Catadores de lixo serão expulsos de Pinheiros”: A Coopamare (Cooperativa de Catadores Autônomos de Papel, Aparas e Materiais Reaproveitáveis) será despejada da parte de baixo do viaduto Paulo 6º, em Pinheiros (zona oeste), local que ocupa desde 1989. Os catadores foram notificados neste mês, mas disseram que não irão sair. O despejo gerou polêmica e mobilizou

Podemos encontrar por todo o Brasil casos de discriminação contra os catadores de lixo. Mesmo quando há um plano de reciclagem de materiais, ele é muitas vezes imposto sem a inclusão das pessoas que já trabalhavam com o lixo. Em Goiânia<sup>7</sup> foi denunciado que catadores de lixo estavam sendo espancados pela polícia como modo de impedir seu trabalho e, principalmente, sua organização como cooperativa. A pressão sobre a importância ecológica da reciclagem e o „crescimento sustentável” faz com que haja preocupação com o lixo material, mas se exclua os que o vêm utilizando como modo de subsistência. Esta rede social passa a ser o resíduo do resíduo.

Por detrás de todas as implicações econômicas que envolvem a recuperação e coleta informal de lixo há um processo cultural importante. Trata-se de um processo de tradução constante que se intensifica com a necessidade de realizar combinações inusitadas com o que está disponível. Por um lado, o lixo é abundante, por outro, como fazer para que possa ser reinserido no sistema e em que sistema(s)? As possibilidades são inúmeras, já que não há lei que defina o uso destes materiais nem o modo de interação destas pessoas. Estar esquecido pela cidade oficial passa a ser vivenciado a partir de maiores possibilidades de escolha. As garrafas PET podem ser recicladas, usadas para a construção de moradias, levar água ou guardar moedas e objetos pequenos que se encontram pela rua. Uma caixa de papelão pode ser cobertor, casa ou armário. Misturar-se ao mercado de rua semanal pode ser a possibilidade de revender peças recuperadas do lixo, ou a manta por sobre onde se vende a mercadoria pirata pode transformar-se em trouxa de roupas quando a fiscalização policial se aproxima.

Os movimentos na sociedade que buscam excluir os economicamente menos favorecidos, os imigrantes ou quaisquer grupos que não sejam considerados parte da sociedade chamada „oficial”, criam não somente um problema a estas pessoas que se vêm incapazes de se integrarem, mas implicam também na alienação do grupo que exclui. Não se trata de evitar a construção do lixo, o que seria impossível.

alunos e professores da FAU (Faculdade de Arquitetura e Urbanismo da USP), que realizam aulas no local e têm o trabalho da cooperativa como alvo de pesquisa. Para o professor da FAU e urbanista João Whitaker, o prefeito José Serra (PSDB) retomou uma política de „expulsão da população pobre das áreas mais ricas, do centro expandido”. A cooperativa reúne 56 cooperados e beneficia uma média de 130 toneladas de material para reciclagem por mês.

<sup>7</sup> [www.midiaindependente.org/pt/blue/2006/12/369276.shtml](http://www.midiaindependente.org/pt/blue/2006/12/369276.shtml), 3 de dezembro de 2006. Acessado em agosto de 2007.

Trata-se de tomar consciência do processo de criação do lixo para que ele possa ser recuperado de modo criativo e não seja somente fruto de um ciclo de consumo, mas da cultura. Flusser (2006:60-61) diz que a história humana não é uma linha linear que vai da natureza em direção à cultura, „mas um círculo que gira da natureza à cultura, da cultura ao lixo, do lixo à natureza e assim por diante“. Por isso falar do resíduo é retomar na análise um elemento que sempre foi parte dos processos culturais.

A negação da importância do lixo implica em questões éticas, estéticas e é de busca utópica, que só pode ser colocada em prática a partir de ideologias totalitárias. Essa cegueira, embora não se trate de um fato recente, acaba sendo apropriada pela filosofia de mercado atual, onde a competição compreendida como algo natural gera uma hierarquia que justifica ações continuamente excludentes tanto em termos sociais quanto materiais.

## Pirataria e Economia

É evidente que o excesso de produção só pode ser sustentado a partir do estímulo do consumo, onde a publicidade é o braço mais forte das estratégias de mercado. No entanto, o contingente de pessoas que não podem participar desta dinâmica é enorme. De aí vem por um lado as falsificações, os produtos piratas. Mas o mais significativo neste panorama é como a pirataria representa para muitos um modo de sobrevivência. O Brasil é considerado o quarto país no ranking da pirataria, só ficando atrás da China, Rússia e Índia. Não por coincidência estes são os países que compõem o grupo dos principais países emergentes economicamente no mundo (o chamado BRICs). A pirataria é um braço forte da economia informal e seus modos de produção e distribuição operam pela fragmentação, ocorrem nos interstícios da cidade ou de modo efêmero para poderem sobreviver à fiscalização.

Desta forma, há a coexistência da aceleração do capital, como mencionada por autores como Santos (2002a), mas que ao mesmo tempo encontra no espaço local tanto seu modo de concretude quanto sua resistência. O espaço torna-se um objeto de consumo descartável, mas ao mesmo tempo ele é apropriado e reconfigurado por aqueles que não podem participar de seu consumo. Os modos como os sem-teto, favelados, imigrantes ilegais, ciganos transitam pelo espaço são também possuidores de uma fragmentação e possibilidade de adaptação que põem em xeque as estratégias velozes de ocupação

do capital. Se há o resíduo artificialmente criado pelo „ciclo de vida do produto“ em Marketing, e os discursos lineares e „eficientes“ da publicidade, há os resíduos culturais produzidos por sociedades onde o excesso e a grande quantidade de combinações possíveis nos processos culturais são responsáveis pelas apropriações tanto dos „restos obsoletos“ do mercado quanto dos resíduos imateriais que o contato entre sistemas distantes oferece. Este processo cria possibilidades de vida emergentes com resultados estéticos que sobrepõem o âmbito artístico, combinando o uso do espaço com meios tecnológicos, comunidades residuais com grupos de mídia tática, a gambiarra de luz com os *warchalkers*<sup>8</sup>. É importante propor estas possibilidades, que podem ser desenvolvidas em um próximo estudo, para que as tecnologias não sejam compreendidas logo de saída como um elemento elitista e invariavelmente conectado ao mercado que lança os „melhores e mais potentes“ com cada vez maior rapidez.

## Conclusões

A *gambiarra*, as estratégias de fuga e fluidez do mercado pirata, as apropriações efêmeras do espaço pelos camelôs, pelos catadores de lixo e pelos moradores dos espaços residuais oferecerem uma visão mais ampla das apropriações informacionais dinâmicas que não estão restritas aos grupos de mídia tática ou coletivos de ativistas políticos nem aos meios digitais como a Internet e a telefonia celular. É importante mostrar que estas formas de organização residuais possuem uma mobilidade constante que encontra nos sem-teto e nos imigrantes ilegais agentes de fundamental importância.

Não se trata de um otimismo em que não se percebe que nos produtos piratas e nas práticas de mercado informal se encontra um braço de um capitalismo voraz e não necessariamente sua alternativa. É exatamente por saber que nos discursos pró-identidade e anti-pirataria se ocultam interesses de contínua exploração dos grupos „excluídos“ que é necessário compreender como estes discursos estão impregnados de incongruências e promessas de falsa estabilidade. Somente desconstruindo estes discursos é possível ver o que se esconde por detrás, perceber que o processo de exclusão vai se alimentando do sistema paralelo dos excluídos,

<sup>8</sup> Grupos que se organizam para detectar e informar locais onde há conexão de Internet sem senha para acesso que esteja disponível à apropriação.

gerando lixo continuamente sem aproveitá-lo de modo consciente, crítico e reestruturador.

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Toby Miller:

## The Oldest New Network: The Division of Cultural Labor and its Ecological Impact

### Abstract

Perhaps the most basic network in modern life is the division of labor. It certainly rates alongside family, school, and town. That inexorably leads to a discussion of how resources are allocated within this division, who exercises power, and what happens when the network meets a seemingly natural or unnatural end. For networks that may appear extremely stable can come to abrupt or scheduled conclusions, when a company goes bankrupt or a school cohort breaks up. This article briefly examines the history of the division of labor, with particular reference to culture and to its internationalization, concluding with a brief discussion of how short-term networks can lead to the exploitation of workers and have a devastating ecological impact.

### Agenda

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## The Division of Labor

In the 14th and 15th centuries, a mercantile system arose from calculations, appropriations, and exchanges of climate, geography, flora, and fauna. Exchanges of goods turned into exchanges of labor. As food commodities made their way around the globe, so did people, often as slaves. When machinery was developed, work split into an industrial mode. Between the 16th and 18th centuries, cities grew into manufacturing sites, populations urbanized, and wages displaced farming as the basis of subsistence (Lang and Hines 1993: 15). These new forms of labor were institutionalized in empire. In the 18th and 19th centuries, manufacturing went on at the centre, with food and raw materials imported from the periphery. In the 20th century, assembly-line control, with its quid pro quo of sufficient wages to buy the products being assembled, became a Fordist paradigm. The labor force was divided between blue-collar workers, who undertook tasks on the line, and white-collar workers, who observed them (Scott 1998: 18).

Differences of opinion emerged about the significance of the balance of trade to a country's wellbeing. Mercantilists thought it should be controlled, but free traders wanted market forces to rule in accordance with factor endowments and an international division of labor. Keynesian responses to the Depression made protectionism a more legitimate position in economic theory, until stagflation emerged from the transnational phase that commenced after the war. By the mid-1980s, offshore production by multinationals exceeded trade between states. Since that time, the global capitalist economy has depended on the integration of production processes; even when geographically dispersed, they remain governed by states and parastatal institutions in the service of capital accumulation. Products are first made and consumed in the centre, in a major industrial economy; then exported to the periphery; and finally produced and consumed „out there,“ once technology is standardized and savings can be made on the labor front. Goods and services owned and vended by the periphery rarely make their way into the centre as imports.

Hence the idea of a New International Division of Labor (NIDL). This model reveals that developing markets for labor and sales, and the shift from the spatial sensitivities of electrics to the spatial insensitivities of electronics, have pushed businesses beyond treating Third World countries as suppliers

of raw materials, to look on them as shadow-setters of the price of work, competing among themselves and with the First World for employment. As production split across continents, the prior division of the globe into a small number of empires and satellites and a majority of underdeveloped countries has been compromised. Folker Fröbel and his collaborators (1980) christened this trend the NIDL. Whereas the old IDL had kept labor costs down through the formal and informal slavery of colonialism (the trade in people and indentureship) and importation of cheap raw materials with value added in the metropole, successful action by the working class at the centre redistributed income. The response from capital was to export production to the Third World, focusing increasingly on young women workers. China is the contemporary epitome of the NIDL at work.

## Culture

So how does the division of labor fit with culture? Artists, musicians, poets, and scholars traveled across royal courts, salons, and universities for many centuries prior to capitalism. But that revolution in social relations in Europe and the US was accompanied by a new method and history to the exchange of bodies, ideologies, images, and money. Culture, which had previously referred to tending land, came to personify instrumentalism at the same time as negating it; on the one hand, there was the industrialization of agriculture; on the other, the tutoring of individual taste. German, French, and Spanish dictionaries of the 18th century indicate a shift in the meaning of culture towards spiritual cultivation and away from animal husbandry. With the spread of literacy and publishing, and the advent of customs and laws that were shared, administered, and understood through the printed word, cultural texts supplemented and supplanted physical force as sources of authority. As the Industrial Revolution moved populations to cities, food was imported and new textual forms were exchanged, for both practical and entertainment purposes. Along came a society of consumers and an art world. There was an obvious corollary in labor terms: the emergence of *poligrafii* in 15th century Venice, and hacks in 18th century London. They wrote popular books about correct forms of conduct—instructions on daily life (Briggs and Burke, 2003). Thus began a division of cultural labor in the modern sense.

With the First World losing manufacturing jobs because of the NIDL from the 1970s, culture be-

came a core employment site in the Global North. Most new jobs within the First World now come from the culture and media sector. Their connection is knowledge, information, emotions, and communication (Hardt and Negri 2000: 285). Daniel Bell discerns four changes in the Global North's economy from production to services:

- the preeminence of professionalism and technique
- the importance of theory to innovate and generate public policies
- the formation of a discourse of the future; and
- new intellectual technologies that help make decisions (Mattelart 2003: 77-78)

This is a technocratic vision dominated by experts, a world of modernity, of rationality, of the ability to apply reason to problems, and seek salvation in the secular. It favors ecological metaphors to describe workspaces, emptying out the core environmental impact on nature of industry at the same time as it denies the solidarity and security of ongoing employment. Manuel Castells suggests we inhabit an epoch of networks of knowledge workers, effectively a ruling class operating through technique and technology. This is not the daily society of humanity, but a society, after Gilles Deleuze and Félix Guattari, of control (Mattelart 2003: 143). Castells discerns two economic models at work here. In the first system, the Anglo-Saxon one, services substitute for manufactures, with finance displacing physical labor. The second model, from Japan and Germany, combines the two, rather than substituting one for the other (Hardt and Negri 2000: 286). For their part, Michael Hardt and Antonio Negri develop the idea of immaterial labor to describe the tendency to exchange information, knowledge, and emotion, filtered through the computer and its methods of invigilation, and abstracted from physical work (2000: 290-92). While this notion of immaterial labor captures the realities of work in the post-industrial sector, it is awkwardly close to forgetting the fundamental ecology of the division of labor—that this is not a network of equality, but domination, and one that imperils the Earth.

Using typologies from Fritz Machlup and Armand Mattelart, I propose the following types of paid cultural and media workers:

- creators, who make new art and ideas
- transmitters, who communicate the art and ideas of others

- transformers, who change art and ideas via form
- processors, who change art and ideas via formats
- interpreters, who change art and ideas via idiom; and
- analysts, who create new interpretations (Mattelart 2003: 63)

Within the culture industries we find the following groups of workers, albeit with much overlap:

- creators, such as musicians, directors, writers, journalists, and technical workers
- artisans, including sound engineers, editors, cinematographers, and web designers
- impresarios, who connect proprietors and executives to creators
- proprietors and executives, who control employment and investment and negotiate with states; and
- audiences, whose labor as workers pays for content, whose labor as interpreters gives it meaning, and whose labor as imaginary people is its alibi

These groups operate within institutional contexts, specifically:

- private bureaucracies, controlling investment and distribution
- public bureaucracies, offering what capitalism cannot
- small businesses, run by charismatic individuals; and
- networks, fluid associations formed to undertake specific projects

Private bureaucracies continue to control most of the cultural/copyright industries, but very frequently in collaboration with less formal networks, while public bureaucracies experience pressure to comport themselves in an ever-more commercial manner.

Since the demise of the production-line, car-assembly-like Hollywood studio-system of production that applied between about 1920 and 1970, but was eroding by the late 1950s, the US film industry has been a pioneer in the loose model of employment beloved of contemporary management. Jobs are constantly ending, starting, and moving. Hollywood exemplifies 'flexible specialization,' a shift from life-long employment to casual labor. It has an economic commitment to 'permanent innovation,'

and a political commitment to control its environment (Piore and Sabel 1984: 17).

Workers and bosses strike complex, transitory arrangements on a project basis via temporary organisations, with small numbers of divers hands involved at each stage other than production, when sizeable crews function both together and semi-autonomously. Places and networks matter in terms of textual cues, policy incentives, educational support, financing, and skills. Time matters because of cost and marketing. Work may be subject to local, national, regional, and international fetishization of each component, matching the way that the labor undertaken is largely fetishized away from the final text. Conventional organizational charts are inadequate to the task, especially if one seeks to elude the conventions of hierarchy through capital whilst recognizing the eternal presence of managerial surveillance. Business leeches want flexibility in the numbers they employ, the technology they use, the place where they produce, and the amount that they pay—and inflexibility of ownership and control (Eisenmann and Bower, 2000).

There were 3,500 film and television companies in Southern California in 2002. Perhaps 0.1% of them hired over a thousand people, while about 75% had no more than four employees (Miller et al., 2005). This makes the industry seem dispersed, and has led to theorizations of it as an open ecological system. But the power and logic of domination by a small number of vast entities is achieved via a huge globalizing network of subcontracted firms and individuals, in turn mediated through unions, employer associations, education, and the state. Movie capital is footloose in its networking, and destructive in its ecology, as the case studies below will illustrate.

## Networks Alive, Exploiting and Polluting

Mexico became a key site for offshore Hollywood production following the success of *Titanic* (James Cameron, 1997). During the film's production, the national film studio Churubusco was renovated and a National Film Commission established, with satellites across the country's 31 states, offering Hollywood moguls everything from trips in governors' helicopters to many other, less exotic, services. Mexico's new film „union“ set up shop in Los Angeles to reassure industry mavens of its cooperativeness and to remain up-to-date on US pay rates—in

order to undercut them. Not surprisingly, Rupert Murdoch cites approvingly the number of European workers invisibly employed in the making of *Titanic*: 'this cross-border cultural co-operation is not the result of regulation, but market forces. It's the freedom to move capital, technology and talent around the world that adds value, invigorates ailing markets, creates new ones.' National Public Radio reported that Rupert's very own Fox company was asking the Mexican Government to offer further financial incentives for runaways even as the privatization of the film industry during the 1990s had decimated local production. Overall, the present conjuncture is a screen testimony to the North American Free Trade Agreement, which has seen the average number of offshore productions in Mexico per year increase from seven to seventeen as the shipment of film stock and special-effects equipment is facilitated, especially for low-budget productions while local production spiraled downwards, from 747 films in the decade prior to the Treaty, to 212 in the decade since (Maxwell and Miller, 2006).

Restoring Mexico to the Hollywood map gained James Cameron the Order of the Aztec Eagle from a grateful government, which offers docile labor, minimal bureaucracy, a weak peso, many US-trained technicians and liaison services. The National Film Commission's web site states that almost 3,000 foreign productions were shot there between 1995 and 2002, from airline commercials to feature films (Maxwell and Miller, 2006).

But there is a cruel irony to the globalization of cultural labor through loose networks: people submerged at the end of the credits (or not listed at all) „owed“ their livelihoods to a boat sunk by invisible ice and business hubris. The village was cut off from the sea and local fisheries by a walled 'movie maquiladora' built to keep them away from production. Fox's chlorination of surrounding seawater decimated the ranks of sea urchins, which Popotla had long fished, and reduced overall fish levels by a third. Meanwhile, it was revealed that the overall cost of the film could have provided safe drinking water to 600,000 people for a year. (Miller et al. 2005: 165). The Popotlanos demonstrated their environmental consciousness by decorating the wall with rubbish to ridicule the filmmakers and call for *mariscos libre* (freedom for shellfish) (for photos, see [rtmark.com/popotlaimages.html](http://rtmark.com/popotlaimages.html)).

Fox again ran into difficulties while making *The Beach* (2000) in Thailand's Maya Bay, part of Phi Phi Islands National Park, where a (textually) modern-

day Eden suddenly turns nasty for jaded tourists. Thai environmental and pro-democracy activists publicized the arrogant despoliation they experienced. Natural scenery was bulldozed because it did not fit the company's fantasy of a tropical idyll: sand dunes were relocated, flora rearranged, and a „new“ strip of coconut palms planted. The producers paid off the government with a donation to the Royal Forestry Department, and campaigned with the Tourism Authority of Thailand to twin the film as a promotion for the country. Meanwhile, the next monsoon saw the damaged sand dunes of the region collapse, its natural defenses against erosion destroyed by Hollywood bulldozers. All the while, director Danny Boyle claimed the film was „raising environmental consciousness“ among a local population that was allegedly „behind“ US levels of „awareness“ (Miller *et al.* 2005).

## Conclusion

We inhabit a world where flexibility is the mega-sign of affluence, and precariousness its flipside. One person's calculated risk is another's burden of labor, inequality is represented as the outcome of a moral test, and the young are supposed to regard insecurity as an opportunity rather than a constraint.

Antonio Negri (2007) refers to people mired in contingent media work as the cognitariat, because they have high levels of educational attainment, and great facility with cultural technologies and genres. The cognitariat plays key roles in the production and circulation of goods and services, through both creation and coordination. Today's 'culturalisation of production' may enable these intellectuals, by placing them at the center of world economies, but it also disables them, because it does so under conditions of flexible production and ideologies of „freedom.“ This new proletariat is not defined in terms of factories, manufacturing, or opposition to ruling-class power and ideology. Indeed, it is formed from those whose immediate forebears, with similar or less cultural capital, were the salariat, and confident of guaranteed health care and retirement income. It lacks both the organization of the traditional working class and the political entrée of the old middle class.

What used to be the fate of artists and musicians—where „making cool stuff“ and working with relative autonomy was meant to outweigh ongoing employment—has become a norm across virtually every sector of the economy. The outcome is contingent labor as a way of life—the triumph of a New Inter-

national Division of Cultural Labor. The results are even worse for the unskilled labor of those who are outside the cognitariat, like many Popotlanos and Thais. It is a timely reminder for those who fetishize the supposedly new „creative“ industries or the information society and economy that it repeats many of the humanly exploitative and environmentally disastrous escapades of smoky industrialism.

There would be no culture, no media, without labor. It is the beating heart of creativity and social justice. When it is reduced to the contingency of network metaphors, it becomes precarious. And when ecological ideas are removed from their explanation of the environment, that precariousness produces an eternal pollution.

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Ned Rossiter:

## **Translating the Indifference of Communication: Electronic Waste, Migrant Labour and the Informational Sovereignty of Logistics in China**

### **Abstract**

This essay is interested in the relationship between electronic waste and emergent regimes of labour control operative within the global logistics industry, the task of which is to manage the movement of people and things in the interests of communication, transport and economic efficiencies. It considers the production of non-governable subjects and (regional) spaces as they figure in the relation between electronic waste, global logistics industries and biopolitical technologies of labour control.

### **Agenda**

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  - MyCreativity Reader: A Critique of Creative Industries. Geert Lovink and Ned Rossiter, (Ed.). Amsterdam: Institute of Network Cultures 2007.

*„As long as there are people on this planet, the waste industries will never die. So we're not worried about the future of the industry.“*

– Owner of a small e-waste processing business in Ningbo, China.

This essay is interested in the relationship between electronic waste and emergent regimes of labour control operative within the global logistics industry, the task of which is to manage the movement of people and things in the interests of communication, transport and economic efficiencies. Central to logistics is the question and scope of governance – both of labouring subjects and the treatment of objects or things. The relation between labour and electronic waste constitutes a milieu (environment) and population (of human and technological life) whose communication comprises a unique multi-scalar space that severely tests techno-systems of governance. In registering the contingency of governance – its capacity for failure or oversight – this essay signals the uncertainty that underpins the technics of control special to logistics.<sup>1</sup> At stake is the connection between the milieu and the labour of human life.<sup>2</sup>

Paradoxically perhaps, conflicting governance regimes make possible the production of non-governable subjects and spaces. Electronic waste and many of those working in its informal secondary economies can be considered as occupants that reside off the grid. Such positioning in itself does not constitute a political program or articulated agency. Non-governance should not, in other words, be assumed to be synonymous with some kind of counter-political force. This would be the error of translation understood as a system of equivalence in which an *a priori* relation exists between, for instance, non-state actors and political agency. Indeed, it may even be desirable for biopolitical powers to ensure a non-governable dimension in order

to manage the political, economic and environmental problem of electronic waste – the maintenance of unregulated informality serves as one of the structural resources that sustains the current economy of waste. Since there is no globally implemented consensus or treaty and quite frequently an absence of national legislation on how to address the economic and social life of electronic waste, it helps to reflect on the question of ewaste by taking this „indifferent“ status of e-waste as a point of departure – both technically within logistics software and politically within the institutional limits of the state apparatus. As I argue below, such indifference comes at a potential political and social cost, one that sees a further expansion and penetration of biopolitical technologies of control over the relatively autonomous aspects of labour and life.

To complement the various hypotheses above, this essay also addresses the relation between regions and the composition of labour in electronic waste industries in China. The multiplication of regions through practices of translation coextensive with the movement of people, language, technological protocols and things presents a serious challenge to regions as they are defined by hegemonic orders and interests. A region such as the European Union, for example, is translated as a legitimate political, economic and social entity through an ensemble of institutions (state governments, international institutions, universities, cultural organizations, labour unions, etc.). While there may be numerous instances of dispute and conflict between such actors, ultimately the fact of their relation serves to mutually reaffirm the legitimacy of the EU as a region. But to reduce the configuration of a region to such translation devices alone is to overlook the diverse practices and technics through which spaces and populations are comprised. The battle of hegemony, in this sense, is a contest over idioms of translation.

Similarly, the social practice of translation brings into question the analytical modalities that assume the existence of the region as a set of stable coordinates and coherent institutional practices that facilitate economies of depletion.<sup>3</sup> In the case of the global logistics industries, the rise of secondary resource flows accompanying the economy of electronic waste is coextensive with the production of non-governable subjects and spaces. I suggest that the relation between these entities constitutes new regional formations that hold a range of implications for biopolitical technologies of control.

<sup>1</sup> Thanks to Soenke Zehle and Brett Neilson for comments and critique of earlier drafts of this essay. The text also benefitted from questions and discussion at the Inter-Asia Cultural Typhoon Conference, Tokyo University of Foreign Studies, 3-5 July, 2009. A parallel can be found here with Schumpeter's logic of „creative destruction,“ where failure becomes the source of renewal in the reproduction of capital. The prospects for a politics of refusal within such a system become extremely depressing in so far as it is unlikely to do much more than reinforce the power of the hegemon. Such a scenario returns us, yet again, to the core question: what *is* politics?

<sup>2</sup> See Canguilhem 2008, also Foucault 2003, 2008.

<sup>3</sup> On translation as social practice, see Solomon 2008.

## Multiplication and Division

With their capacity to adapt flexibly to a range of circumstances and skill requirements, the rural migrant worker in China is arguably the exemplary post-Fordist subject rather than, as often assumed, the specialist work of the designer, architect, filmmaker or ad-man attributed to the figure of cognitive, creative or immaterial labour. Such a distinction in the body of labour-power points also to the residual class dimension of post-Fordist labour, which in this case is frequently underscored by the spatial division between rural provinces and metropolitan centres. Ethnic divisions also prevail, with the rural migrant worker often enough not belonging to the Han Chinese majority population.<sup>4</sup>

Fieldwork undertaken earlier this year with my MA students in Ningbo – a 2nd tier and major port city a few hours south of Shanghai – began to make visible (at least for us) the „division and multiplication of labour“ within the electronic waste industries.<sup>5</sup> Mezzadra and Neilson:

*„By speaking of the multiplication of labor we want to point to the fact that division works in a fundamentally different way than it does in the world as constructed within the frame of the international division of labor. It tends itself to function through a continuous multiplication of control devices that correspond to the multiplication of labor regimes and the subjectivities implied by them within each single space constructed as separate within models of the international division of labor. Corollary to this is the presence of particular kinds of labor regimes across different global and local spaces. This leads to a situation where the division of labor must be considered within a multiplicity of overlapping sites that are themselves internally heterogeneous.“<sup>6</sup>*

And as Neilson elaborates elsewhere:

*„It is crucial to note that the multiplication*

*of labour does not exclude its division .... Indeed, multiplication implies division, or, even more strongly, we can say multiplication is a form of division.“<sup>7</sup>*

Hierarchies of labour separate the first stage of waste processing and storage from the initial collection of unwanted trash in the cities of China. The looped tape recording of *diannao* (computer/electronic brain) and *kongtiao* (air conditioner) rhythmically alerts locals to the arrival of the junk men and women as they move about neighbourhoods on a bicycle equipped with a flat tray for the transport of waste. Situated among those at the bottom of the supply chain of electronic waste industries (others working in particularly toxic conditions include children who disassemble electronic products, stripping copper from plastic casings while inhaling poisonous fumes from incineration), the junkmen are among the most transient in the economy of e-waste. The working life of junkmen is one of low income and frequently changing low-skill jobs determined by the fluctuation of market economies and the informal social networks and family demands that shape the movement of populations from country to city, job to job. Here, we see the multiplying effect of labour: while hierarchically distinct from other modalities of work in the economic life of electronic waste, the job of the junk men and women is underscored by mobility and uncertain transformation. It is unlikely, in other words, that waste collection is a job for life.

A different story prevails, however, in the case of many of the small businesses that deal with the sorting of electronic waste. Like many Chinese cities, the waste collection centres dispersed across the neighborhoods and districts of Ningbo are pivotal sites in the social and economic life of electronic waste. Often run as small family businesses, these recycling centres can be divided along formal and informal lines, both with differing degrees of toxicity in terms of the type of waste materials collected. Of the thousand or so businesses with official licenses to operate in Ningbo (a legal requirement in Zhejiang province), there are many more that exist illegally. At 6000 RMB (approx. 600 Euros), the annual license fee is a costly obstacle for many, yet it offers a level of economic and political security not afforded by the illegal collection centres. The official sites tend to have a regular network of waste suppliers based on *guanxi* (social relations or networks) and, unlike the illegal sites, do not negotiate prices.

<sup>4</sup> See Hess 2009. See also China Labor Watch 2009.

<sup>5</sup> Students were enrolled in a module entitled Urban-Media Networks in the MA International Communications, University of Nottingham, Ningbo, China. Module blog: <http://orgnets.cn>. For an analysis that offers more specific detail of e-waste in Ningbo, see Meng 2009.

<sup>6</sup> Mezzadra and Neilson 2008.

<sup>7</sup> Neilson (forthcoming).



This in turn affords the junkmen a level of guaranteed income, albeit with wildly fluctuating and typically declining prices over the past year. Trading prices for metals are set each morning according to futures markets, which are usually accessed as daily updates by mobile phone more often than through computers.

External and internal forces have placed enormous pressure on the recycling industry and labour conditions across China. The owner of one small licensed recycling company we spoke to, who had been in business for 15 years, made note of the Chinese Labor Contract Law, which came into effect in January 2008, making it harder for companies to sack employees.<sup>8</sup> He offered this reference as an indication of the more stable and secure working conditions for the migrants he employs from Jiangxi and Húnán provinces to the west of coastal Zhejiang.

By contrast, reports produced by various human rights NGOs and environmental monitoring organizations document numerous instances where workers' rights are violated in the electronics factories and recycling industries, with excessive and often unpaid working hours, hiring of child labour, gender divisions, dangerous working conditions, suppression of efforts to organize labour and strike actions, fines and punishments for violation of highly punitive rules (correct haircuts, smoking in designated areas, improper attire, wastage of water, making noise, posting or distributing unauthorized articles, etc.).<sup>9</sup> More broadly, in her assessment of the legislative reform of labour conditions, Jenny Chan notes „severe rights violations in at least three major areas: job security; the use of contingent labor; and fair, fixed-term labor contracts.”<sup>10</sup> Worker layoffs from factories have also been on the rise since the end of the Chinese new year – the social effects of this became rapidly clear, if relatively short-lived, on the streets of Shanghai and Ningbo, with increased numbers of homeless migrants and visible instances of untreated mental illnesses.

Improved labour conditions are often perceived by businesses and investors to come at a cost rather than a benefit in terms of higher productivity through workplace stability. Other economic forces

impact in more immediate ways. Since 1st of January 2009, recycling companies have had to absorb the cost of a 17% value added tax – a burden not suffered by other industries. This comes on top of an enormous drop in prices of around 50-60% for recyclable metals due to the global economic recession. With successive months of depressed prices, the global recycling economy is now dire. In China, this manifests in the form of massive stockpiling of waste that cannot be sold. There are additional storage costs and increased health risks associated with prolonged exposure to inventory accumulation of toxic metals, to say nothing of increased pressures on labour.

Another owner of a Ningbo recycling business, Mr Yu, assessed the situation in the following way earlier this year:

*„Metals and papers are online transactions. Copper and aluminum are sold and bought in the futures markets. For China, marketing Chinese products is fine, however, in the global market it is hard to do good business. I have to purchase and sell the waste at cheap prices. I suppose the economy will improve. Copper makes more profits, however it makes me lose more money. Now the price of copper is 17 yuan/500 grams compared with the previous price (27/28 yuan / 500g) – we lose 10 yuan per 500g. We are a small business. Foreign waste such as plastic, copper and aluminum are packaged and put into containers that are transported to Beilun dock.”*

## The Battle of Standards

The connection made here between electronic waste and the maritime industries is worth noting. Despite the fact that importation of electronic waste in China has been illegal since 1996, much of the movement of waste from North America, Europe, East Asia and Australia is channeled through the ports of China.<sup>11</sup> There's a story to be told here about the global logistics industry. In short, logistics is concerned with the management of global supply chains and labour regimes. The electronic waste industries obviously fit into that schematic. Aided by software applications and database technologies, logistics

<sup>8</sup> See Chan 2009.

<sup>9</sup> See Chan and Ho 2008.

<sup>10</sup> Chan 2009, p. 46.

<sup>11</sup> For maps and a short overview of e-waste flows in the East and South Asian regions, see UNEP, also Maxwell and Miller 2008.

aims to maximize efficiencies at all levels. In terms of labour management, the optimum state of governance arises at the moment in which the execution of a task, or Standard Operating Procedure (SOP), is registered in the real-time computation of Key Performance Indicators (or KPIs). In other words, the labour control regime is programmed into the logistics chain at the level of code. Similarly, the governance of labour is informatized in such a way that the border between undertaking a task and reporting its completion has become closed or indistinct. As such, there is no longer a temporal delay between the execution of duties and their statistical measure.

The potential for escape, invention and refusal become severely compromised within such a biopolitical regime of control, one that is already dominant for millions working across the world in different industries articulated with global logistics systems. Moreover, and most oddly, it would seem that the capacity for capital to renew itself is substantially challenged within such a system: logistics aims to diminish the force of contingency, which plays a key role in the emergence of innovation upon which the reproduction of capital depends. Do we find here, then, an instance whereby capital programs its own obsolescence?

An important control device in the maritime industries is radio-frequency identification (RFID) technology, which registers the geographic position of ships and goods and assists in the management of inventories and the efficiency of supply chains. While RFID technologies are indifferent to the matter of things, and thus do not discern between, say, automotive parts or textiles on the one hand, and electronic waste on the other, their database logic nonetheless identifies the content of motion. In other words, the database provides a record of that which migrates from one place to another. And in the case of electronic waste, there are strict national and international regulations governing its transport and treatment. But since, as noted earlier, electronic waste is deemed an illegal import in China, it is questionable whether it falls into the purview of the database and its informatized sovereign power. Like many countries, electronic waste holds a contradictory status within the rule of law in China, with waste businesses requiring a license to operate, as mentioned previously.

In another respect, the connection between electronic waste, logistics and software systems constitutes the battle of standards across idioms of translation. The governance of labour associated with

electronic waste varies enormously depending upon whether or not the movement, economy and treatment of e-waste is made visible by logistics software used in maritime logistics, to take one example. In such a case, there are industry, state and union standards that shape the conditions of labour and management of waste. Logistics software facilitates such relations by tracking cargo movement, registering times of passage in global supply chains and accounting for inventory accumulation. The standards established in such an economy run into conflict, or are just modulated differently, when the circuits of labour and resource flows associated with electronic waste are translated through less formal standards found in economies not officiated by the state. The case of electronic waste in China is one of these economies. The sex-trade in and across many countries and regions would be another.

Translation can be understood in one sense as the process of establishing standards expressed through a community of practice. In Naoki Sakai's terms, this is the „homolingual“ operation of translation.<sup>12</sup> Yet such an occasion should not be seen as the endpoint of translation, but rather in terms of the instantiation of a particular border that promulgates new modes of practice and relation. Indeed, it is precisely the scene of conflict that attends the drive toward standardization that raises the problem of translation.<sup>13</sup> The example of standardization in the shipping and transport industries helps clarify this process.

The standardization of shipping containers from the 1950s was accompanied by disputes between engineers, corporations and governments over competing economic and geopolitical interests in the transport industries.<sup>14</sup> By the 1970s a global standard in containerization had been established, around the same time economic globalization came into full swing following the end of the Bretton Woods Accord in 1971 and the oil crisis of 1973. Such cursory contextualization indicates that standard containers did not alone determine or create economic accumulation (the same might be said for logistics software). Marc Levinson notes that by the late 1960s,

*„The economic benefit of standardization ...*

<sup>12</sup> See Sakai 2006, 1997.

<sup>13</sup> Thanks to Brett Neilson for highlighting this formulation.

<sup>14</sup> See Levinson 2006, pp. 127-149.

*was still not clear. Containers of 10, 20, 30 and 40 feet had become American and international standards, but the neat arithmetic relationship among the 'standard' sizes did not translate into demand by shippers or ship lines. Not a single ship was using 30-foot containers. Only a handful of 10-foot containers had been purchased, and the main carrier using them soon concluded that it would not buy any more. As for 20-foot containers, land carriers hated them.*"<sup>15</sup>

Conflicts over standards in logistics and software systems define the terrain of translation in more recent years. Logistics, as defined earlier, is concerned with maximizing efficiencies in global supply chains and labour regimes. Once the logistical problem of container standardization had been resolved, the work and political economy of translation shifted to data standards. While present in a primitive form in the 1960s, the computerization of transport industries did not really take off until the 1980s following the standardization of shipping containers and the advent of just-in-time production. Effectively integrating and simulating the logic of containerization in order to produce enhanced efficiencies, the information architecture of code can also be understood as a container or silo formation.<sup>16</sup> Again, the drive toward interoperability across different software systems is an example of translation as homolingual address or equivalence.<sup>17</sup> Software technologies are key devices in the translation of labour and the mobility of things as actionable, visible and subject to control and instrumental consolidation. Once registered within the database logic of informatized sovereignty, electronic waste and its modalities of labour and social life become governable within the economy of real-time. Such an idiom of translation is one of co-figuration and equivalence, to draw on the formulation of Sakai. Yet logistics software consists of multiple standards whose disparities in code produce conflict and competition in the effort to determine systems commensurate with the demand for intermodal freight transportation, pervasive labour manage-

ment and economic hegemony. Such tensions over standardization give rise to the heterolingual dimension of translation – its social practices of „differential inclusion,“ struggle and multiplication – that confers a non-governable potential to electronic waste.<sup>18</sup>

While I am in no way idealizing such practices – as noted earlier, there is enormous social, environmental and individual damage that attends the toxic life of electronic waste – I want to stress that once captured within the instrumental world of logistics that economizes labour, life and space according to efficiencies in time, the work of translation becomes automated and effectively annulled. And it is precisely at this moment of informatization coupled with logistics that the region becomes constituted within the sovereign space of the database. Once code is king the variable capacity of labour, life and things finds itself subject to an intensive form of territorial and proprietary control that formal settings such as ASEAN, APEC and NAFTA can only gesture towards.<sup>19</sup> But no matter how much communication regimes may be indifferent to noise, contingency, feedback and indeed life itself, the difference necessary for the work of translation is never entirely eradicated by techno-scientific systems.<sup>20</sup> More likely certain modes of labour and life simply migrate off the radar and subsist instead in a world of non-governance, by which I mean idioms of expression, practice and economy external to the state-corporate nexus that defines contemporary sovereign power.<sup>21</sup>

<sup>15</sup> Levinson, p. 144.

<sup>16</sup> Thanks to Julian Kücklich for bringing this point to my attention.

<sup>17</sup> There is a strong case to be made here for understanding the network structure which defines contemporary relations of communication and economy in terms of the principle of „notworking.“ For an elaboration of this concept and condition, see Lovink 2005.

<sup>18</sup> On the concept of „differential inclusion,“ see Neilson (forthcoming).

<sup>19</sup> Association of Southeast Asian Nations (Indonesia, Malaysia, Philippines, Singapore and Thailand), <http://www.aseansec.org>; Asia-Pacific Economic Cooperation (21 members), <http://www.apec.org/>; North American Free Trade Agreement (Canada, Mexico, United States), <http://www.nafta-sec-alena.org/>.

<sup>20</sup> The indifference of communication is equivalent to self-referentiality, which is another way of saying that such systems are high on redundancy. This said, it would be a strategic mistake to think that such operations are without material effects.

<sup>21</sup> I understand this relation not in terms of some kind of absolute exteriority – a position increasingly untenable in a capitalist and techno-social system of immanence – but rather in terms of a „constitutive outside.“ For an elaboration of this concept as it operates within network societies and information economies, see Rossiter 2006.

## The Limits of Translation

With its indifference to matter, substance or qualities and concern instead with the management of mobilities and efficiencies of action, logistics dispenses with borders that distinguish labour, life and milieu.<sup>22</sup> In doing so, the constitutive differences that make possible the translation of relations between labour, discourses, social-technical practices, economies and geocultural formations is surrendered to the world of ubiquitous homologies.<sup>23</sup> What I am calling „ubiquitous homologies“ stems from the political economy of globalizing design industries (where architecture begins to resemble a sports shoe, toothbrush, motorbike, office chair, computer monitor, etc.), and shares something with what Sakai terms „co-figuration,“ „linguistic equivalence“ and „homolingual address“ – all of which are homogenizing operations of translation that comprise the sovereign power of the nation-state.<sup>24</sup>

This is the limit of translation, and hence the scene of the political. With borders (limits) comes struggle. It may seem a contradiction is at work in this formulation: the subtraction within logistics of constitutive differences does not immediately lend itself to the idea of the political as the struggle with borders. Nor does such a formulation of logistics as a system of techno-social and economic practices of indifference to borders correspond with the concept of translation, which both assumes and requires difference as a condition of operation. How, then, to address the political and conceptual challenges that attend the rise of new indifferent forms of communication and governance? The erasure of constitutive differences through the biopolitical power of logistics defines the limits of translation. But the occlusion of difference should not be taken as some kind of finitude since the coding of indifference in itself multiplies

the fields of distinction through the force of relations.<sup>25</sup> There are and always will be relations. In this process new border struggles are comprised and the work of translation is remodulated in ways coextensive with the production of subjectivity.

The analysis of electronic waste flows serves to cleave the inter-relations of software, labour and logistics in order to identify how the indifference of communication special to logistics technology points to the limits of translation, which holds implications for biopolitical regimes of governance. The heterolingual address of translation is the analytical method that makes visible the possibility of escape from biopolitical technologies of control at work in the global logistics industry. Or, rather, the non-governable dimension of social and economic life within the electronic waste industries asserts a singular indifference to the regulatory control of logistics. This is the practice of refusal. The extent to which labour and life can withstand the encroaching predisposition of logistics as a control system *par excellence* is – in part – a matter of time, capital and the sovereign demand that populations comply with technologies of governance.

A study of the economies and socialities of electronic waste in China helps illuminate the political status and potential of non-governable subjects and spaces. The earlier discussion of labour and the circuits of exchange in Ningbo's electronic waste industries are a case in point. As forms of social relation, the labour and economy in Ningbo's e-waste industries operate outside the scope of state-corporate regimes of governance supported by logistics technologies of control. Of relevance here is the constitution of regions and the politics of translation in order

<sup>22</sup> While some of the key voices of Italian political philosophy – notably Virno, Lazzarato and Negri – maintain that the borders of language, political action, labour and life have become indistinct with the advent of post-Fordism, my interest in this essay is to maintain a conceptual separation between categories of this sort in order to suggest how the control society instantiated by the global system of logistics and its use of software to manage labour practices amplifies even further the increasing indistinctions between labour, life and the possibility of a politics of refusal. This argument is developed further in Rossiter 2009.

<sup>23</sup> See Sakai 2006, 1997. See also Ivekovic 2005.

<sup>24</sup> The work of „heterolingual address,“ by contrast, engages the antagonism of incommensurability within cultural difference, thus providing a basis from which to critique – among other things – the geopolitics of sovereign power.

<sup>25</sup> The indifference of logistics to borders is only internal to its technics of operation – a kind of generic predisposition – and does not hold a determining force in any totalising sense or „last instance.“ With reference to Randy Martin's *An Empire of Indifference*, Brett Neilson suggests that at work here is perhaps not „an indifference to borders so much as a process of commensuration across borders.“ Certainly such an understanding corresponds with the much-vaunted ambition on the part of computer engineers and their policy advocates (to say nothing of academic devotees such as Henry Jenkins and advertising gurus) to arrive at a state of „convergence culture“ (or, more simply, economic globalization in its social-technical form). While this may indeed be the case, in the passage below I'm also wishing to invoke this dynamic of communicative – and thus spatial – indifference in terms of the social and economic dimensions of electronic waste as an assertion of refusal, irrespective of whether or not such a practice is fused with political content. The key question here is: What expressive capacity might non-governable subjects and spaces consist of? Neilson 2009. See also Martin 2007.

to address an emerging tension of scale that extends more broadly to the global management of labour and life at play in the logistics industry. Such an analytical strategy indicates how the problematic of non-governable spaces and subjects – for better and worse – reside beyond the „informational sovereignty“ that imbues the biopolitical power of logistics. The social practice of translation (re)constitutes regions as they figure around the economy of electronic waste. Translation here is not so much a conscious act on the part of workers in electronic waste industries – at least not in any way that I am capable of discerning – as a social-technical relation of exteriority that arises through structural conditions and the techno-social operations of logistics software managing the movement of labour, commodities, resources and finance. What I am calling a social-technical relation of exteriority extends to the challenge of method and analysis: there is always the subject that resides beyond comprehension, that refuses to be known as such – something Gayatri Spivak carefully analyzed as the politics of the subaltern condition.<sup>26</sup>

In so far as that which is perceived or manifests as non-governable – the labour and economy of electronic waste, in the case of this essay – some final points can be proffered. The spatialities of non-governable subjects constitute regions in ways that do not readily correspond with more hegemonic regional formations. Translation thus becomes a form of inventing new circuits of movement. Within such a context, regions become contested geocultural and political spaces, bringing into question the dominant understanding of regions as defined within the political-economic discourses of trade agreements, innovation and knowledge transfer and statist formations of geopolitical equivalence such as ASEAN and its expansion into ASEAN+3 (China, Japan, South Korea) and ASEAN+6 (Australia, New Zealand, India). Regions, when understood as conflictual constitutions underscored by the movements and frequently informal practices of language, culture and labour, comprise geocultural formations that seriously question the power of border technologies such as trade formations, migration and labour regimes, state alliances and global logistics. Moreover, the analytical method of translation as social practice and heterolingual address initiates a critique of sovereign power by elaborating the tensions embedded within the

informal and formal dynamics of geocultural configurations. Sovereign border regimes, in other words, are brought into question with the rise of non-governable subjects and spaces associated with the social-economic life of electronic waste.

Informal circuits of exchange comprise the multiplication of economies that attend the movement of electronic waste. Such configurations may be territorial in terms of the distribution of waste, as seen for example in the intra-national or trans-regional economies of electronic waste. Within this complex of relations there is a sense in which the non-governable aspects of labour, waste and economy reside outside the biopolitical power of logistics technologies.

While this essay has concentrated on the very localized case of electronic waste in Ningbo, there are always multi-scalar dimensions and circuits that both manifest in the local and connect the local to the trans-territorial whose specificities reconfigure how the regional comes to be understood. As long as the movement and treatment of electronic waste evades the sovereign power of informatized logistics, then the connection of waste with regions remains open to the possibility of multiple configurations.

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Paul Carter:

## Polyhedral: Recycling Boundary Ecologies

### Abstract

Foregrounding the extent to which 'place' remains resistant to the politics and poetics of 'network culture', this essay approaches place as a boundary ecology rather than as an instance of cultural invariance. It calls on readers to think about attempts to actively recycle cultural 'debris' or 'waste' through an ethics of passage instead of the kind of instrumentalist statics that prevents the development of an ontology of mobility. Conceding that such a capacity to inhabit passage is compromised by the eschatological language used to communicate the implications of environmental disaster, as well as by languages of consultation that (conceptually) empty place of any creative power to incubate alternatives – events, modes of relation –, the essay stresses the mythopoetic techniques that produce places as knots or nodal points within a network of passage. The designer's task is to create the hinge mechanisms that render such boundary ecologies inhabitable imaginatively, and by materialising the nexus between creativity and change to alter our position vis-a-vis our ethical responsibilities as citizens of a shared biosphere.

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A concept resistant to the politics and poetics of 'network culture' is *place*. In these remarks the counter-intuitive idea of place *as network* is explored. A network identified as a distinct location has to meet certain qualitative criteria. The volume of information flowing through it is unimportant. What counts is the quality of the information, its poetic potential to generate new meanings at that place. Information that communicates poetically makes use of signs that are polysemous. Figurative language, visual symbols and other media of aesthetic expression exhibit fields or inter-communicating regions tied together by an associative logic that instrumental reason discounts as subjective or tied to interests. However, the recognition that mythopoetic processes have a distinct architecture, topography and topology has heuristic consequences. It enables data that claim to be monosemous (without ambiguity) to be identified as 'nutrient deficient' in terms of sustaining the information community. Filtering can also operate positively. Qualitatively defined regions or networked places may provide a creative matrix in which abandoned cultural material reattaches itself to living traditions. Cultural 'debris' or 'waste' is recycled and acquires new meanings, collection and recollection contributing to the humid conditions in which invention flourishes.

Place is used here in the context of urban and landscape design. Even a short history of place is impossible here. The salient point is that an anthropological notion of place dominates place-making design discourse. In establishing the criteria and nominating the signifiers that will constitute the definition of place, whether in restoration, adaptive reuse or new place-making projects, a cultural reductionism operates. Our centralist bureaucracies colonise place-making opportunities as onerously as professional anthropologists used to reify other cultures. It has been difficult to recognise that 'different cultural formations ... were not an invariant structure, that they might have circulated with other alternatives, their application depending on the interpretive authority of particular actors.'<sup>1</sup> Yet at least a post-ethnographic perspective is now making this possible. By contrast, democratic societies remain bound by an idea of culture that is inflexible, monosemous and powerful in proportion to its susceptibility to representation. Academics bemoan the perpetuation of colonialist mentalities

abroad but, in the arena of public space design, the prescriptive impositions of planners, designers and architects embody a will to subjugation quite as repressive as anything practised in colonial times.

Community consultations ahead of major urban design initiatives replicate the situation in which ethnographers, missionaries and colonial administrators used to interrogate compliant 'native informants' about the local cultural conditions. Anyone who has been involved in these sessions knows that participants may have 'widely different perceptions of what [is] said, what things mean,' and that any occasion for place-making may be 'not so much an occasion for conformity as for temporary consensus building.'<sup>2</sup> But this opportunity to improvise new social ties, to negotiate intercultural reconciliations and other provisional accommodations goes undocumented. The goal of these ritualised consultations is to establish the themes that will represent the heritage of the site. Authentic place-associations are sought, even when the destruction of the inherited structures, their physical and ecological relationship, is planned. In this ghoulish context, the public finds itself invited to provide copy that will furnish the tombstone for what has disappeared. In this sense, all government-auspiced public art is collaborationist, and tends to accelerate the very amnesia it purports to resist.

I write these notes in a hotel room at the recently-opened Darwin Waterfront. I look down at a site where I have been invited to design a 'cultural facility' that will secure the development's 'sense of place'.<sup>3</sup> The site is a rectangular, and therefore artificial, peninsula extending into a shallow water lagoon protected on all sides by crocodile-proof wharfs and pontoons. The mildly sloping peninsula lawn is indistinguishable from any suburban park in northern Europe. The spur-winged plovers have noisily colonised it, carrying on their vernacular courtship rituals. Later, sunbakers spilling over from the Wave Pool will transpose flirtation into the human domain. But what, apart from these thinly inscribed tracks of migrants and tourists, constitutes the identity of this recent extension

<sup>1</sup> Myers 7.

<sup>2</sup> Myers, op.cit., 8, with reference to a meeting of Pintupi elders which the anthropologist attended.

<sup>3</sup> My design studio Material Thinking has been commissioned by the Darwin Waterfront Corporation to develop a 'vision' for the site that will incorporate a cultural facility, an open-air performance space and associated designed environment.



into the tideless salt water? The colonisers set up camp in a shallow bay at the foot of the escarpment.<sup>4</sup> They chose a site flanked by two low coastal outcrops. In the century and a half since these rough beginnings, the bay has been modified beyond recognition. The mangrove swamp has been eradicated; the two hills removed for industrial and security purposes respectively; and land fill has inexorably extended the old water line seawards. A handsome curving jetty dominates the sea view. And now a residential-commercial complex of no great architectural merit has been erected. What is 'sense of place' here?<sup>5</sup>

In western thinking *place* and *sense of place* occupy different but related discursive regimes. The genealogy of place is traced back to terms such as *topos* and *chora*. In this conception places are conceptual spatial containers or operative voids. They are the raw material of planning. Sense of place theories have their origins in the modern invention of landscape, and its picturesque theorisation. In one derivation sense is associated with French *sentier*: mobile, where place is static, sense of place emphasises qualities of orientation and, path-making. In the latter case 'A social-experiential orientation emphasizes meanings that are created as people interact with a place and with each other in a place, developing connections to the place.'<sup>6</sup> However, these respectively quantitative and qualitative conceptions of place are also related. 'Sense' may accrue to place through its human usage but the place remains logically prior to its interpretation. Interpretation may be imaginative - Thomashow argues that developing a 'place-based perceptual ecology' is the basis of learning 'how to move beyond that place and explore the relationship between places', explaining that 'you practice biospheric perception by virtue of three interconnected pathways - natural history and local ecology, the life of the imagination, and spiritual deliberation.'<sup>7</sup> However, even in this formulation of place as a network of relationships potentially global in its outreach, the idea that place may be a verb

twinned with displacing, in which other alternatives are embedded, is not entertained.

The site below my window - and the window view - are enduring forms of acts of placement predicated on displacement. They are works of passage that disguise their environmental presumption, illustrating the privileged position of the imaginal in the western construction of reality. What is seen is less significant than the construction of a view point and a view. To understand what had to be left out to achieve this identification of place with its model is not to recover archaeologically an older, more authentic habitat. It is not another act of virtual reconstruction or projection. It is to begin the work of remarking passage. A critical sense of place is one that develops tools for calibrating the *sentiers* said to lend places their experiential drag. The pathways may be physical grooves, representable in plans, but they signify because they bear poetic associations, rhythmic, kinaesthetic, metrical and ultimately poetic dimensions. They are discursive in the etymological sense. In this case, what is called place emerges where *sentiers* meet, intersect, interfere with one another or cancel each other out. Place is not a meeting place of stories - themes that the heritage lobby can restore and reinterpret - but an arrest, or filtering, of passage.

A sense of place that did not suppress the act of placing (and its cognates - displacing and replacing), that did not subjugate acts of becoming at that place in the name of an ideology of cultural invariance, would not explore 'the relationship between places', but the phenomenon (the ethics and aesthetics) of relating - the mythopoetic techniques that produce places as knots or nodal points within the network of passage. This proposition is not merely theoretical. It is put forward in the context of figures like Bruno Latour advocating *passage* as a conceptual cure for the kind of instrumentalist statics that prevents the development of an ontology of mobility.<sup>8</sup> In general, the study of relationality - and all that goes with the logical physics of the in-between - is predicated on end places, stable destinations between which the psychological and historical dramas of becoming are played out. The new rhetoric of passage dispenses with these end points - with the consequence that all is flux and any model for stable change is lacking. The possibility of a mythopoetic orientation to the flux, one that calibrates passage

<sup>4</sup> The early colonial history of the site is conveniently available at [www.cdu.edu.au/newsroom/origins/edition1-2007/origins1-2007-waterfront.pdf](http://www.cdu.edu.au/newsroom/origins/edition1-2007/origins1-2007-waterfront.pdf) where historian Kathy de la Rue's article 'On the Waterfront' can be accessed.

<sup>5</sup> The delivery of a 'sense of place' was a repeated demand of community consultations held in 2004 and 2005.

<sup>6</sup> Farnum, Hall & Kruger 1.

<sup>7</sup> Thomashow 14.

<sup>8</sup> See discussion in Carter 2008, 266-267.

through the identification of polysemous events (and/or places), is a corrective to an anarchic vision that, strictly speaking, defies marking, remarking and therefore communication.

In poetry metre stabilises flux: metre is a design on rhythm. In any case certain patterns are filtered from the field of change so that there emerges a thick boundary, and the reconfiguration of passage as a hinge place where change is institutional and exhibits stable forms. These reflections begin to elicit what 'sense of place' might mean outside my window. Community consultations held five years ago found that people wanted certain stories told. They also wanted a meeting place. The inference was that a new public space should be designed that incorporated such themes as Indigenous Dreaming narratives, colonial accounts of first contact and settlement, evocations of the pearl shell and pearl economy, together with symbolic representations of various non-human attributes (biodiversity) and human characteristics (multiculturalism) of Darwin and the 'Top End' generally. A parody of this wishlist would be a functional 'meeting place' (incorporating informal performance facilities) staked out with symbolic representations of the grand narratives said to define Darwin's identity. Such a theatrical mix would successfully preserve the ideology of cultural invariance, and empty the site of any creative power to incubate 'alternatives' - that is, to incubate the possibility of anything taking place or happening.

*Sentiers* give passage sense, just as passage scores places. Here, the first clue to the arrangement of things is the successive walls normally relegated to the status of scenography: the window, the jigsaw of divisions across the hotel grounds, the breakwater, the handsome curving wharf, the horizontal coastline of the Cox Peninsula with its refineries, and the horizon itself - I say 'itself' but the horizon is also seven-shelled with mother-of-pearl cloud laminations climbing into the dusky evening. If you Google Earth the region, passing from one scale to another, you discern that the geographical forms exhibit a Mandelbrot-like tendency to reproduce essential characteristics at different scales. The generalisation of this is a coastline that is not a line at all but an arrangement of permeable passages - promontories sinking to form necklaces of islands, the emergence of straits, alternative passages and new permeable barriers - spits, banks and shoals - created and uncreated by tidal fluctuations. At progressively smaller scales, the archipelago effect

is reproduced in the constitution of coastal flora - the aerial root system of the mangrove swamp is a field of stakes that supports a colloidal medium (mud) able to stabilise land-sea relations. The oyster that finds a home in this humid environment carries out its own filtering operations. The *branchiae* or gills leach the salt water for nutrients and occasionally by a kind of fertile oversight admit grit that a process of nacreous inhumation transforms into pearl.

These stories of passage that makes a difference could be multiplied. They are essentially sites where the flux is inscribed with significance, where media incubate embryonic forms. The structure of these forms is hingelike, jointed, constitutionally doubled and asymmetrical. Their philosophical counterpart is Parmenides' figure of a gate filled with gates. Their historical counterparts are the mimetic performances improvised wherever Europeans encountered non-Western peoples: an archetypal instance occurs a few kilometres north-east of where I write. The *Beagle*, in which Charles Darwin circumnavigated the globe, was subsequently deployed as a coastal survey vessel. The great theorist of hybridisation was not part of the survey that encountered Larrakia people near here. He was not witness to the spectacle of English officers 'dancing for their lives' at the foot of a cliff on which, at least in the melodramatic lithograph prepared for the publication of Stokes's journal, Indigenous warriors furiously brandished their spears. This absence did not prevent the naturalist's name being appended to our section of coast (and subsequently to a town). But the point is that the antics of the officers and the naming practices of their captain are related acts of place-making.<sup>9</sup> In both cases, a mere coincidence is exploited. Wickham's reasons for commemorating a former *Beagle* passenger *here* remain inscrutable: perhaps he perceived in the potential harbour an analogue with the collecting places that Darwin favoured. Here was a geographical hollow where debris, or overlooked data, accrued, a bay where passage had slowed down and sedimented, providing the evidence (for those who could interpret it) of change.

<sup>9</sup> The illustration referred to here is reproduced in my *Dark Writing* on page 64. The 'third voyage' (1837-1843) of the *Beagle*, to survey the coasts of Australia was under the command of John Clements Wickham. Wickham named Beagle Bay and Port Darwin with the *Beagle's* previous (second) 1831-1836 voyage in mind in which the naturalist Charles Darwin circumnavigated the world.

In any case, a discourse of passages is one that continually renews itself, in the absence of a fixed grammar (or invariant culture) continuously filtering the environment for indications of intention. The site of the Larrakia encounter became known on the map as Adam Bay, a mythopoetic acknowledgement of the fact that coastal communication was *adamic*, representing a vernacular re-enactment of Logos as Creator. What signified in these tense exchanges was not any content - the trading of agreed signifiers - but the tidal momentum of the desire to communicate. In these situations the traditional, anthropologically-sanctioned relationship between place and place name is inverted. Place names are compacted stories or myths of place-making: the deplorable effect of colonisation, we are told, is to uncouple names from their places - 'What people thus lose is the relationship between the stories and the particular portion of the ground.'<sup>10</sup> In this case, names/place-names like Darwin and Adam Bay, obey a different, future-oriented associative logic, one in which the attachment of a signified to the signifier lies in the future, and the value of the name resides not in the place it conjures up but in the opportunity it creates to imagine settlement.

The phases of this proleptic toponymy might be compared to the first stages of the oyster's life in which motile larvae begin to develop a foot, seeking out places where they can moor themselves (initially with hairlike fibres) and eventually attach themselves. Similarly, the over-determined cultural signifiers *Darwin* and *Adam*, articulated in a new context, throw off acquired associations and circulate freely; however, the fertility of their cultural associations is soon captured by the colonial imaginary, whose mythic techniques of self-legitimation rapidly endow them with a distinct location and originary authority. Perhaps it follows, to take the analogy a step further, that a critical place-making (in a postcolonial context) seeks not to reproduce the mythological narratives of founding but would attend instead to the noise that accompanied these efforts at translation - or, in oyster talk, it would ponder the grit that goes unattended and triggers off the reactive (and creative) formation of pearl. Translated into discursive terms, a recognition of the mythopoetic

techniques<sup>11</sup> that add value to passage is the basis of any incursion into the discursive domain likely to be sustainable, fertile in suggesting new *topoi* and topics.

There emerges from these Waterfront reflections an idea of place as a boundary ecology, as a filtration system in which flux is endowed with a network character, as if it could be imagined as a double figure integrating wall and way, fence and flow. The architecture of passage is characterised by knots where different story lines do not simply meet but entangle, hybridise or otherwise activate a principle of mere coincidence to improvise a chiasmatic or riddling formation. To riddle is to speak enigmatically, to veil senses: it is also to sift coarse material. The act of sifting works here to preserve data that do not conform, which for this reason hold the potential to attract new associations or revive old, neglected ones. In design terms data of this kind are forms that may look strangely familiar but which resist identification. Such forms serve as hinge works, mediating between different physical states, diverse story lines and cultures of settling. In the context of designating a boundary ecology poles have this function: stylised islands, mooring posts, palisades, sticklike figures, gills, nets ... they are twinned in this typology with hollows, bays, ears, shells and other sail-like receptacles materialising the history of passage. It is evident that these signatures of passage localise, materialise and connect, but the sense of place they might incubate does not replicate the 'place-based perceptual ecology' Thomashow advocates.

Instead of practising 'biospheric perception by virtue of three interconnected pathways', the wanderer in this networked place experiences the suspension of settlement, the creative and recreative potential of passage to produce out of chiasmatic events ambiguous settings. These offer creative templates not for the restoration of invariant cultural stereotypes but for things to take place. Staged here is the setting of exchange rates and the shadows cast by the processes of filtering, selecting, classifying and quarantining essential to the constitution of stable forms and identities. These are clearly choreographies with a global application, but they educate not by leading out from the neighbourhood but by marking and

<sup>10</sup> Weiner 2001, but no further reference given in Thomas F. Thornton 31.

<sup>11</sup> Mythopoesis: a critical re-evaluation of mythic narratives, usually associated with periods of semiotic crisis or degradation. See the discussion in Carter 2004, 170-176.

remarking exploratory *sentiers* amid it. These sentiers are not paths yet. In fact, they may never evolve into signposted ways through the labyrinth: passage here will have the same oscillatory nature as breathing, always timed and placed, always expressive, relational, dependent and poised between inspiration and expiration.<sup>12</sup>

The capacity to inhabit passage, to recover the act of place-making - to make these interstitial activities constitutive in an environmental as well as creative sense - demarcates one function of art in the context of the eschatological language used to communicate the implications of climate change. It is not sufficient to use art instrumentally to show forth what environmental scientists seek to prove with numbers. The challenge is to articulate the common place these warnings are designed to defend. But the common place cannot be the flat plane of instrumental reason and its institutions. It must be composed differently - in the way sketched here as a region of gathered creative potential, analogous to a high pressure region in meteorology. The designer's task is to create the hinge mechanisms that render this boundary ecology inhabitable imaginatively, and by materialising the nexus between creativity and change to alter our position vis-a-vis our ethical responsibilities as citizens of a shared biosphere.<sup>13</sup>

If terms like *place* or *sense of place* can survive in this coastally-imagined arrangement of passage or hinge forms - of gates within gates - it may be in the transfigured guise of the *hedra*. This term, the third in the *chora, topos, hedra* triad, dropped out of use, it is speculated, because of its vulgar associations with the human rump or backside.<sup>14</sup> The term *hedra* is associated with ideas of settlement. It is a thing properly placed or the proper place of things. In other words, it is a hinge term that expresses the doubleness of place when it is conceived as an act of placing. In contrast with

the planning orthodoxy (and its heritage counterpart), which imagines sense scored into blank surfaces, the location of the *hedra* is simultaneously a medium disposed to receive an impression and the impression made. Evidently, this act of placing cannot be thought in the abstract. Nor can it be thought in isolation: just as a track is always a multiplicity or field of impressions, indicating a double moment of arrival and departure, so the *hedra* is always *polyhedral*. The Platonic appropriation of this term is intriguing. It suggests a disposition to aggregate. But the thinking that sees connections is humid not dry. The figure that might be imagined forming between the pulsed artificial surf of the Wave Pool and the imperturbable band of sea beyond the wharf will not be a closed faceted geometrical figure but a thick boundary, a filter work encrusted, eroded, oddly recollecting, imagining and inventing the unsettling act of settlement.

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<sup>12</sup> Implicitly contrasted with design practices that produce Ersatz senses of place or, worse the anomie of placelessness, these emotionally-engaging networks of sentiers might aspire to be aesthetic counterparts of what Hokari refers to in Gurindji philosophy as the 'Right Way' - 'a geographical landscape as well as human behaviour. Morally is spatial as well as behavioural.' The design is ethical not because it successfully cites traditions associated with the place but because it rightly orients people, teaching them 'how to look after this created world.' (Hokari 216-217).

<sup>13</sup> On the concept of 'boundary ecologies' in ecological discourse, see Forman 82ff.

<sup>14</sup> See Algra 95. Hence kata + hedra (cathedral): to sit down.

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Roberto Verzola:

## 21st-Century Political Economies: Beyond Information Abundance

### Abstract

As a result of the relatively low cost of digital reproduction, a global transformation is occurring in the nature of products and processes and in types of goods and services. Arising from information abundance, this global transformation is making the phenomenon of abundance a major field of study, not only for economists but also for other social scientists and physical scientists as well. This essay proposes an economic definition of abundance and a typology of sources of abundance. It argues that real economic abundance can come about only when the demand for a good is finite and the plentiful supply makes the abundant good affordable enough to all members of society. It lists an abundance-nurturing ethic as a major goal of abundance management, and encourages economists to make abundance together with scarcity their conceptual point of departure. Finally it links the phenomenon of abundance to the concept of the commons.

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- „Studying Abundance“. 2008.
- *Toward a Political Economy of Information: Studies on the Information Economy*. Quezon City: Constantino Foundation, 2004.

The key technologies that mark best the transition from the twentieth to the twenty-first century are the new information and communications technologies (ICTs). These new ICTs are at the core of the global information infrastructure and emerging information economies. These ICTs, the Internet and information economies have spawned services such as electronic mail and mailing lists; online sites for sharing text, audio, photos, video, databases, software, DNA sequences, and whatever else could be turned into bits, bytes and files; search engines for locating specific tools, services and content; and portals that collect, organize, improve and recombine existing material as well as attract new material. They are transforming business, education, mass media, culture and other information-intensive sectors of society. Their impacts are also spilling over to housing, transportation, agriculture, and other human activities not usually associated with high information content.

Because of their distinctive features, these ICTs, the Internet and the emerging information economies are bound to shape in significant ways the political economy of the 21st century. and modes of production, another in the world of biological processes, their complexity and organicity.

### **Outstanding Feature of Information Economies: Abundance**

To those who are part of it, the most outstanding feature of the 21<sup>st</sup> century economies emerging out of the new ICTs is the abundance of both old and new information content, tools and services – some of which were not necessarily generated by computers but, having been digitally converted from their original format, are now available online.<sup>1</sup>

This outstanding feature can be attributed mainly to a new-found ability made possible by the new ICTs – the unlimited reproduction of exact copies of originals over any number of generations, for distribution over electronic networks or more traditional outlets through various transportable physical media.

This ability, in turn, has turned information goods into a unique commodity, whose cost of producing

an extra unit is approaching zero. This diminishing marginal cost can be seen clearly whenever one makes a copy of a digital file, either by downloading it from a network to one's hard disk or by saving a copy to a compact disc or a DVD. The social, economic and technological consequences of the near-zero marginal cost of reproducing information goods gives the information economy its distinctive features.

### **Information Abundance: Sharing, Cooperation and Altruism**

The near-zero marginal cost of copying information goods makes them nonrival goods, i.e., one can enjoy the good without diminishing other people's enjoyment of the same goods, just as taking a photograph of a beautiful scenery does not prevent others from taking their own photographs. It is a perfect situation for sharing, because one can copy and share the good without losing it, resurrecting what has been variously called the gift economy or the economy of altruism.

Consider a situation where one has a piece of information, and another has a second piece. Sharing enables both to have the two pieces. Together, the two pieces may, in turn, lead to a third piece, deduced from the first two. The third and the original two, pieced together, may further lead to a new deduction. This synergism, where the result is more than the sum of its parts, can result in explosive information growth. A piece of bread must be divided to be shared; in contrast, knowledge shared multiplies. This near-magical property of information has been compared to the Biblical miracle of the loaves.

### **Economic Substitution**

Economics is, among other things, cost-driven. In general, producers tend to shift from higher cost materials and processes to lower cost substitutes that make their operation more profitable, and consumers from higher priced goods and services to lower priced substitutes that enable them to buy more goods. Economists call this the „substitution rule“.<sup>2</sup>

<sup>1</sup> Anderson.

<sup>2</sup> Samuelson and Nordhaus p. 127.

As the prices of information goods go down, they will tend to be substituted for other types of goods. This can be seen in the increasing variety and volume of information commodities, such as software, e-books, e-games, databases, online journals, online music, online video, and other ICT goods, services and activities. This can also be seen in the increasing information content of material goods – as costly manual, electro-mechanical, or chemical processes and parts are implemented in low marginal cost software running in mass-produced microprocessors.

This substitution of the electronic for the electromechanical, digital for the analog, software for hardware, information-intensive „intelligent“ methods for energy-intensive „brute force“ methods, and information goods for physical goods will, according to economic theory, continue until a new maximum is reached in terms of profits for every producer and utility for every consumer. This will also draw additional investments into more profitable ICT businesses, further altering the mix between agriculture, industry and the information sector within economies. We are witnessing today a global process of substitution in products and processes and in types of goods and services. This process began in the 1980s and the 1990s with the widespread use of digital electronics, microprocessors and electronic networks. The end of this momentous global substitution process is not yet in sight, especially since the marginal costs of information goods continue to diminish, and the cascades of old and new abundance triggered by this process have not fully run their course.

Thus pressure continues to build upon every provider of goods and services in every sector of the economy to turn to ICTs, with new technologies and businesses emerging to facilitate and speed up this process. To give a few examples:

- The knowledge, publishing, media and entertainment industries are now all converging on the Internet.
- Whenever possible, the movement of people and material goods is being replaced by the movement of ideas and information goods, over the Internet.
- The face of health, education, and other personal services is changing through automation and networked operations, also over the Internet.
- With the pace of gene sequencing speeding up and with genetic engineering on the verge of breakthroughs in converting stored digital

information about DNA sequences back to live DNA, the whole biological sector may soon become part of the same convergence, unless safety considerations intervene.

- Manufacturing will be revolutionized by software-driven desktop fabricators, which can do 3-D printing using various media, including electronic media.<sup>3</sup>
- When Moore's Law eventually takes hold over thin-film photovoltaic cells and their prices reach a tipping point, the public will finally be enabled to start tapping for electricity generation the greatest abundance of all – the sun's energy.<sup>4</sup>
- Financial transactions are initiated, negotiated and consummated on the same information infrastructure and are often executed by computers programmed to respond automatically to changes in prices and trends.
- Technologically lagging countries are becoming hosts to encoding facilities, call centers and other left-over industries that serve mostly customers in technologically leading countries.

## Multiplicative Abundance

We will call the archetype of abundance that is created when the cost of reproducing the resource approaches zero, multiplicative abundance. Goods belonging to this archetype are abundant because the means for making multiple identical copies have become so accessible and the cost of doing so has become so low, that they are easily reproduced essentially for free. This dynamic is fast becoming the driving force of 21<sup>st</sup> century economies.

To even acknowledge at all the existence of abundance is a huge conceptual leap for many economists, whose fundamental assumptions are based on scarcity. Some economists even say that abundant goods cease to be interesting because the problem of scarcity has been solved. But if abundance solves the problem of scarcity, shouldn't economists devote as much time to the solution as to the problem itself? The answer should be obvious. Indeed, the study of abundance should be a major field of study, not only for economists but

<sup>3</sup> Gershenfeld p.72-75.

<sup>4</sup> See, for instance, Hunt, Rich.



also for other social scientists and for physical scientists as well.

Having identified one archetype of abundance, which we called multiplicative abundance, we should at once be curious if there are other archetypes. It turns out that there are a few more archetypes of abundance. One archetype is brought about by self-reproduction.

## Biological, Ecological Abundance: A Living Gift of Nature

While the abundance of ideas and knowledge in the information sector comes from the intrinsic human urge to communicate and to share, in agriculture and nature it comes from the intrinsic ability – instinctive urge, in fact – of living organisms to reproduce themselves. All living organisms reproduce their own kind and are therefore a source of biological abundance. Their biological design enables most of these organisms to tap solar energy directly through photosynthesis, or indirectly by feeding on organisms that have stored this energy in their bodies. As living organisms increase their numbers, they also organize themselves into a food web of producers and consumers – vegetarians, omnivores, carnivores, predators, decomposers, and various other ecological players, creating a self-maintaining ecological system that from a human perspective can last essentially indefinitely. A society that learns how to tap these ecological systems as natural capital can generate with minimal effort unending flows of natural income for meeting the needs of that society's members. This abundance archetype may be called the reproductive archetype.

Reproductive abundance is essentially a gift of nature for *Homo sapiens*. We simply need to learn how this abundance has come about, to preserve and enhance the biological and ecological processes that lead to this abundance, and to protect these processes from threats that can lead to disruption or failure.

Left to their own, forests, grasslands, soils of all kinds, ponds, rivers, lakes, bays, seas, oceans, and waters of all kinds will teem with life, almost every ecological niche occupied by one or more species. By their very nature, as long as the right conditions exist for the reproductive processes to occur, ecological systems of interacting biological webs of organisms will provide us a timeless source of abundance.

Properly tapped, this abundance of life can further lead to cascades of abundance, promising a cornucopia of agricultural, biological, natural and ecological goods and services for human societies.

The basic management approach to this archetype is to recognize the many natural incomes possible from one source, to withdraw these as needed while ensuring that the natural capital is preserved and enhanced, so that the resource can provide human societies perpetual income streams. This requires intimate knowledge and deep understanding of biological, ecological and other natural processes.

We have now identified two abundance archetypes, the multiplicative abundance of information goods and the reproductive abundance of living organisms. Information is a non-material good. Organisms are made of living matter.

Non-living matter is the basis of two more archetypes.

## Massive Abundance: A Bulky Gift of Nature

The two additional archetypes are based on the massive bulk of certain elements and compounds in nature. Air is available to all. Water too, with exceptions. The abundance of sand promises a practically inexhaustible source of silicon, which provides the elemental basis for the hardware infrastructure of the information economy as well as future solar energy economies. The hydrogen in the sun provides the Earth with abundant renewable solar energy that creates its own cascades of abundance. It is solar energy that drives all living systems, the water cycle, the global circulation of air. Properly tapped, it will provide humanity with inexhaustible sources of solar, wind, water and ocean energy that can make dirtier non-renewable sources like fossil and radioactive fuels unnecessary. The third and fourth archetypes are both archetypes of massive abundance of natural elements and compounds found on Earth and elsewhere, another gift of nature, by their sheer bulk, to *Homo sapiens*.

We use the substances belonging to the massive-persistent abundance archetype for their material content – air, water, sand, minerals, etc., as raw material for the finished products we make. We use the other substances belonging to the massive-dissipative archetype for their energy content – coal, oil, natural gas, and so on.

Because abundance based on persistent mass consists of matter, and matter is never really destroyed, such abundance persists, once it is made available. All the metals dug out of the earth since *Homo sapiens* started using iron, copper, bronze, tin, aluminum, etc. are still above ground, somewhere – in dumps, basements and cellars, and various nooks and corner of human dwellings, whether in use and abandoned. The persistent type undergo very little chemical transformation during their use. Most of the different metals dug up as ore, processed, and subsequently incorporated into a finished product, possibly ending up as waste, still exist as metal today, slowly oxidizing somewhere. Their persistence allows them to be reused or recycled over and over again, with little additional chemical processing.

The key towards appropriate management of this archetype is a better system of recovering and recycling the resource, to enhance the persistence of these abundant goods for their human users.

Some of the other raw materials are so transformed after use that these are essentially one-time use materials. (Other uses, of course, may be found for the transformed by-products, like using waste heat from cooling condensers for space heating.) These include all those we use for their energy content. We can call them massive-dissipative resources because they are dissipated after use. They are the depletable, exhaustible resources. While we may start with an abundance by virtue of their bulk, the use of the resource transforms and depletes it. Once used, that's it. Given the known reserves and current rates of consumption, for instance, the world's oil reserves are at best good only for a few more human generations. Then they will be gone. Other non-renewable energy resources also fall under this archetype.<sup>5</sup>

The principal management approach for this archetype should be conservation, to leave as much of the resource to future generations, who may discover much better and more efficient ways of putting these non-renewable resources to good use.<sup>6</sup>

In addition to the above four, still other archetypes of abundance also exist, such as:<sup>7</sup>

**Psychic Abundance.** Human needs exist which cannot be met by material, information, or energy goods or services. Beyond the minimum biological requirements of food, water and protection from the elements, for instance, health is as much a matter of happiness, contentment and a sense of community and belonging. It is as much a mental as a physical state. Those who live in voluntary simplicity or even in obvious material lack may still enjoy a sense of abundance that comes from states of emotion and thought that may be variously called psychological, emotional or spiritual.

**Derivative Abundance.** These types of abundance are derived from the other archetypes. Thus they may take on some of the features of their source, but they may also pose unique features of their own. Wind power, for instance, is a derivative of solar power, with solar heat turning the earth's atmosphere into a heat engine that generates air movements which can then be tapped for energy generation. Part of this heat engine drives the hydrological cycle, from which comes another derivative source of abundance, the power of flowing/falling water. When we learn to build on the foundations of existing abundant resources to create cascades of new abundant phenomena, we will see more new types of derivative abundance.

## Pseudo-Abundance: Bads Posing as Goods

A phenomenon sometimes presents itself as a case of abundance. We may later find out that it comes attached with a darker side of ills and bads. Even worse, the „abundance“ may in reality be a poisoned pill of ills and bads that are actually meant to undermine real abundance and create artificial scarcity, but are sold as a good or service that claims to benefit an unsuspecting public.<sup>8</sup>

It may take discernment and time to determine which is which. Who would have thought that farmers will accept – not to mention pay for – powerful poisons into their soils? That mothers would deny their babies the nourishing breast milk nature has

<sup>5</sup> Some may quibble that solar energy is also depletable because it will run out of hydrogen in a few billion years.

<sup>6</sup> For some discussion on possible abundance management approaches, see Verzola 2008, also Verzola (in press).

<sup>7</sup> For other possible classifications of abundance, see Verzola (in press).

<sup>8</sup> For additional discussion, see Verzola (in press).

freely provided for them, and prefer instead to buy troublesome antibiotic- and hormone-laden formula milk? Have we taken into account the environmental and health costs involved in creating the new ICT infrastructure? Few people today look at the bads associated with ICTs, their production, use, and disposal. The study of abundance must make these costs visible, so that they can be taken into account whenever the cost of digital reproduction is considered, and so that the bads associated with ICTs can also be eliminated over time.

We need to be vigilant about these types of „abundance“, so we can reject and eliminate them. Unfortunately, our production methods often generate them as a by-product of production. Responding to this negative „abundance“ involves avoiding being locked into production methods that rely for raw materials on toxic and non-biodegradable substances or which create them as by-products or as the main product itself, and shifting to technologies of *clean production*. The model of clean production is the ecological model of food webs, which finds use for every by-product and creates closed production loops.

## The Demand Side of Abundance

Abundance archetypes represent the supply side; let us now look at the demand side. It is almost by definition that economists predominantly focus on scarcity, when they define economics as the study of „the most efficient ways to allocate scarce resources to meet unlimited human wants“. If, indeed, people had infinite wants, then not even all the resources of this finite world will be enough for a single person.

It can be argued, however, that consumer wants are not infinite. There exist physical, physiological, psychological and cultural limits – both actual and potential – to consumption which can keep individual as well as collective needs and wants within finite bounds.

If these needs and wants are finite, then satisfying them becomes a real possibility, and relative abundance is within reach.

## Finite Wants

The following concepts will help show that needs and wants can remain within finite bounds:

**Satiation.** Economists define satiation as the consumption level which the consumer most prefers. The closer the consumer is to this level, writes economist Hal Varian, „the better off he is in terms of his own preferences“.<sup>9</sup> This satiation level for a bundle of goods is also called the bliss point. Beyond it, the consumer prefers to have *less* of the goods. Many economists still cling to the hedonist principle that „more is always preferred to less.“ But some acknowledge, at least in theory, that a satiation level exists for some, if not most, goods. Varian, in particular, says that most goods have a satiation point and that „you can have too much of nearly anything,“ which contradicts the „unlimited wants“ assertion in most definitions of economics.

**Saturation.** While satiation may apply more to the psychological attitude of a consumer not *wanting* more, saturation is more about the physiological or physical incapacity of a person to consume more. Beyond the saturation point, one's body either will become incapable or will involuntarily reject additional servings of food and drinks. One can only wear so many clothes, or shoes. One can listen to only so many CDs or watch only so many videos. There are only twenty-four hours a day after all.

To reach the brain, a sense stimulus takes around 10-20 milliseconds. To respond in a conscious way, neuro-scientists have found out, the brain takes longer – around 500 milliseconds (half a second).<sup>10</sup> This suggests that our brain can only enjoy at most two distinct events every second or about 170,000 every twenty-four hours. For a world with some six billion people, that adds up to an upper limit of one quad (i.e., quadrillion) consumption events per day. That is a huge number, it is true, but finite nevertheless. Most of us will probably exceed our saturation levels long before that point.

The argument for saturation is further strengthened by the findings of experimental psychologists that people – and animals too – get less pleasure from any stimulation, the more often it happens. Not only does the pleasure diminish, but the stimulation soon becomes undesirable.<sup>11</sup> So, the finite time to consciously respond to sensory stimulation sets a limit to the variety of stimulation one can respond to, and a single type of stimulation will also soon become undesirable, likewise setting a limit on the desirable

<sup>9</sup> Varian p. 43-44.

<sup>10</sup> Matthews.

<sup>11</sup> Scitovsky p. 35-40.

amount for that type. Economist Tibor Scitovsky has further argued that not all sources of stimulation can be exchanged in the market and therefore add to economic demand.<sup>12</sup> All these support the argument for a finite bound to consumer needs and wants.

**Satisficing.** Even before we reach our satiation or saturation levels, we may already reach our „satisfied“ level, in which the quantity we have of a particular good or bundle of goods already *suffices to satisfy*, and beyond which we would only weakly prefer more.<sup>13</sup> In contrast to satiation, which results in a strictly lower preference beyond the bliss point or satiation level, points beyond the satisficing level are either equally preferred or only so slightly or weakly preferred that it does not make a difference. The idea that consumers *satisfice* rather than optimize when fitting their wants to their budget was first raised by psychologist Herbert Simon, who subsequently won the Economics Nobel Prize in 1978.<sup>14</sup>

**„Inferior“ Goods.** Still another economic concept supports the idea of limited human wants. This is the concept of „inferior“ good, which are goods which we buy less of as our income increases. These tend to be goods which are considered „necessities“, and whose consumption tends to plateau and even decrease, as consumers increase their income. The levelling off of consumption is a mark of self-limiting demand.

While any of these „sat“ concepts – certainly all of them, together – are enough to argue that individual and likewise needs and wants have finite bounds, this paper is inclined to base its definition of abundance on the satisficing concept. On such basis, the following is asserted: *some consumers*

*have a satisficing level for some goods.*<sup>15</sup> As the price of a good goes down, consumers will then be able to afford enough to reach their satisficing levels. The following stronger assertion is further proposed: *all consumers have a satisficing level for some goods.*<sup>16</sup>

The above assertions lead directly to a formal definition of abundance: *when a person can afford enough quantity of a good or bundle of goods to reach his/her satisfied level, then the person enjoys a state of abundance for that good/bundle of goods.* The concept is not new. Gandhi must have been referring to abundance when he said „the Earth has enough for everyone's need“. This definition also allows a good's state of abundance with respect to one person to be quantified: it is the ratio of that person's affordable quantity (economists call this *demand*, which varies according to price) to his/her satisficing level, which is the point where any further reduction in price does not anymore increase that person's demanded quantity. For instance, if a person's satisficing level is five pairs of shoes, but s/he can only afford two pairs (i.e., s/he is only willing to buy two pairs at current prices), then s/he enjoys a state of abundance of 40% (two out of five) with respect to shoes. This makes it simple to relate abundance to its inverse, scarcity: the person needs three pairs more to reach the five-pair satisfied level. Thus s/he faces a scarcity level of 60%.

For a group of consumers, the level of abundance can be determined by aggregating the quantities each individual can afford (the demand), divided by the aggregate of their individual satisficing levels. This makes it possible, in theory, to determine the relative level of abundance (and scarcity) of a good for an entire society.

<sup>12</sup> *ibid.*, p. 81-83.

<sup>13</sup> Economists often represent the quantity of good desired relative to another good (or other goods) using indifference curves, which include on the same curve equally preferred ratios of one good over another. Through the same graphical tool, „satisfied“ levels may then be described using thick indifference curves. Such thick curves mean that small increases in quantity of a consumer's bundle of goods do not increase a consumer's preference for that bundle, suggesting that they have reached their satisfied level. Standard indifference curve analysis can then be used to determine the economic implications when consumers reach this level. One implication, for instance, is that the demand curve turns concave as the satisficing level is approached. This upsets the First Fundamental Theorem of Welfare Economics, which assumes strictly convex indifference curves and non-satiation. This is the theorem which asserts that a free market leads to an optimally efficient allocation of resources.

<sup>14</sup> See Simon.

<sup>15</sup> „Satisficing“ seems to have no noun form. Instead of „satisfaction“ - which many economists use to mean „reaching the highest level desired“ rather than „meeting a level that suffices“ - this paper uses „satisficing level“ if the level has not been reached yet, and „satisfied level“ if it has been reached.

<sup>16</sup> The satisficing principle is widely used in logical/mathematical proofs and, by extension, in all physical, natural and social sciences that use such proofs in their fields. Consider the following assertions: (1) A, B and C imply X; 2) D and E imply X, and 3) F implies X. As soon as the truth of (1) is proven, the *sufficient* conditions for X will have been *satisfied*, a very common exercise in many fields. Subsequent work may show that (2) and (3) are also true, with (3) possibly established as the *optimal* sufficient condition for X. But (1), (2) and (3) are all *equally sufficient to satisfy* the conditions for X. Anyone who has ever established, used or accepted such proofs is, in effect, using the satisficing principle.

Economists usually assume that business firms maximize their profits by producing until their marginal cost (the cost of the next additional unit) equals their marginal revenue (unit price of the good). If, in addition to this behavioral assumption, diminishing returns or decreasing returns to scale – or equivalently -- increasing marginal costs are also assumed, then the increasing marginal costs will eventually equal the good's market price. In economic theory, this is the point of maximum profit. Thus business firms will, in theory, reach their satiation point when they reach their maximum profits.

This also means, however, that profitable firms employing technologies with constant or increasing returns to scale will face constant or decreasing marginal costs. They will therefore have no profit maximum and likewise no satiation level. These firms will conform to the theoretical hedonist idea that „more is always preferred to less.“ They will try to keep increasing their scale of operations, in an unending chase for profits – making them an engine of globalization.

It is the profit-motive, it seems, that keeps us away from abundance, not „infinite“ human wants.

## Aggregate Abundance

Based on the stronger assertion made above, the level of abundance for a group of consumers can be determined by aggregating the quantities each individual can afford, divided by the aggregate of their individual satisfaction levels. This makes it possible, in theory, to determine the relative level of abundance (and scarcity) of a good for an entire society.<sup>17</sup>

Cooperation among consumers raises the possibility of further improving the aggregate level abundance, given the same supply and individual demands. Sharing resources and cooperative consumption can make it possible for a group of consumers to buy more goods or services and get nearer their satisfaction levels, improving their aggregate level of abundance. A car, for instance, may meet the daily commuting needs of one or multiple persons. Compared to books in someone's shelf, books in a community library can be enjoyed by many more people.

Beyond the pooling of resources, cultural mechanisms can also bring satisfaction levels and demand down, further improving a society's level of abundance. Extolling simple living, highlighting voluntary simplicity, focusing on the spiritual aspects of life, or idealizing asceticism are various ways by which material accumulation is deemphasized and a society's level of abundance enhanced from the demand side. As Gandhi put it when describing his own experiments in voluntary simplicity, „the real seat of taste was not the tongue but the mind.“<sup>18</sup>

## Abundance Studies: A New Field

Clearly, abundance and its identified archetypes are a common feature of our world. To harness such abundance and build cascades of more abundance for the benefit of human welfare is, as clearly, a desirable goal. Abundance, therefore, deserves our attention as a major field of study and research. If abundance has not gotten the full attention that it deserves, it is for the following reasons:

- Economics has generally focused its attention almost exclusively on scarcity, creating a blind spot among economists.
- It is easy to take for granted an abundant resource like air or soil.
- Powerful economic agents try to either undermine abundance or to subject it to private control, to create artificial scarcity and generate further possibilities for profit-making.

However, with the emergence of information economies and the growth of information abundance, this phenomenon cannot be denied or ignored anymore. In fact, the economics of abundance is becoming an extremely interesting field of study. This field can draw lessons from the information sciences, life sciences, agriculture, material sciences, physical sciences and of course not only economics but the rest of the social sciences as well.

Elsewhere, I have proposed basic goals for abundance management:<sup>19</sup>

<sup>17</sup> Abundance levels that exceed 100% may be called a state of *absolute* abundance.

<sup>18</sup> Gandhi p. 52.

<sup>19</sup> Verzola (in press).

- Make the source of abundance accessible to more citizens. This is essentially the goal of social justice, for distributing the benefits of abundance to a larger portion of, if not the whole, population.
- Make the source last longer, preferably indefinitely. This is the goal of sustainability. Ideally a source of abundance should be managed so that it will provide the present and future generations with a perpetual stream of benefits.
- Develop an abundance-nurturing ethic that creates among the community of beneficiaries a mindset that is strongly protective of the source of abundance. Aldo Leopold well-known „land ethic“<sup>20</sup> and Sandra Postel's parallel „water ethic“<sup>21</sup> are examples of such abundance-nurturing ethic.
- Attain dynamic economic and ecological balance. Unlimited growth is abundance is not possible in a finite world. Abundance in nature can occur indefinitely only when a dynamic balance is attained among abundant elements through closed material cycles. Today, we must learn to cope with four major sources of imbalance: a) our reliance on a non-renewable energy base; b) the linear production processes of industry which deplete our raw material sources and create toxic or non-biodegradable wastes; c) the unchecked growth of human populations; and d) the unlimited corporate drive for profit.
- Build cascades of new abundance. By learning to recognize the conditions that lead to abundance, we may soon learn how to create new abundance patterned after the cascades of abundance found in nature.

## Abundance Creates Commons

It is clear from these goals that abundance studies feed into another area of current huge interest, the study of the commons. After all, abundance naturally creates the need to manage a common resource. Approaches to commons management have relied on appeals to the common good, and the values of sharing, cooperation, altruism and community spirit, as well as explicit regulatory measures, economic incentive and disincentive systems, cultural norms and practices such as restrictions, prohibitions and taboos, and other institutional mechanisms. Complex social behavior and hierarchies of communal use and access rights have evolved among ancient tribes and other traditional societies, for managing abundance and the commons, and these have served them well for many generations and perhaps for the future as well. Successful modern commons such as free/open source software and the Wikipedia have also evolved their own rules and patterns of behavior for managing the abundance that characterizes the emerging information economy. A rich theoretical and practical heritage in commons management, which has learned to cope with and to manage both abundance and scarcity, may be found in the literature of the commons.<sup>22</sup> These should serve us well in subsequent abundance studies.

## Conclusion

The new technologies in information and communications have created a new type of good whose outstanding feature is its abundance. The abundance of information goods has made them cheaper relative to other goods, leading to a massive process of substitution, as consumers and producers shift to information goods away from physical goods. Aside from the abundance inherent in information goods, which this paper calls multiplicative abundance, biological abundance may also be found in nature, given the inherent urge and ability of all living things to reproduce their own kind, thus the term reproductive abundance. A third type of abundance is the massive abundance of such materials as sand, water and air. The creation of other abundance out of these archetypes can lead to a cascade of derivative abundance, which if properly tapped promises a life of plenty for human societies. However, one

<sup>20</sup> „A thing is right when it tends to preserve the integrity, stability and beauty of the biotic community. It is wrong when it tends otherwise.“ See Leopold 1966.

<sup>21</sup> „Make the protection of water ecosystems a central goal in all that we do.“ See Postel 1997.

<sup>22</sup> Ostrom, Dietz, et al.

must also beware of pseudo-abundance, which consists of bads and ills posing as goods.

The promise of abundance can turn into reality not only due to huge increases in the supply of goods, but also when the demand for goods itself is limited, as can happen when satiation, saturation or satisfying occurs. With finite wants, the attainment of true abundance becomes a real possibility. The literature of the commons provides a rich source of material for studying the management of abundance.

These considerations justify the emergence of a new field of abundance studies, that will look at the economics of production and consumption of goods not only from the perspective of scarcity but also of abundance. After all, a major goal of any economy - and by extension any economist - should be to realize abundance for all.

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