Global flows of data, kits and protocols in Asian Hackerspaces: from food and DIYbio hacking to participatory monitoring of radiation

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ABSTRACT

Various hacker, maker and DIYbio activities in recent years around the world mark the start of the global Hackerspace culture and its alternative networks of knowledge creation and sharing. The global flow of open data, kits and scientific protocols in these alternative R&D centers serves the needs of a striving, tinkering and geeky culture, which is often perceived as an underground without any ambitions to influence the policy makers or interact with the large public. Should we label these activates as just another case of popularization and dissemination of the professional research knowledge similar to some science amateurs and citizen science activities? Should we emphasize the start up and entrepreneurship ethos and its search for commercialization of various technologies similar to the goals on any start up incubator? Should we have a closer look into the art and design activities happening across various Hackerspaces that create a tension with the more mundane but also technical goals? In this paper we will discuss examples of Asian Hackerspaces that emerged in recent years that prove fruitful synergy between all these activities. The alternative R&D underground in our opinion is a model of how science and technology can be integrated with education, entrepreneurship and culture rather than an aberration or some form of delusion. More importantly, we want to demonstrate how the Hackerspace culture gained a momentum in the recent Fukushima disaster and proved its ability to interact with policy makers and serve the needs of the larger society. While media, government, non- and inter-government organizations were speculating on the size of the Fukushima Daiichi nuclear disaster and discussing issues of nuclear safety, standards and policy measures, individuals and small groups around Tokyo Hackerspace created tools for citizen to deal directly with the disaster and measure data with open source hardware tools. Tokyo Hackerspace empowered citizens by offering open source hardware and software platforms to build solar lanterns, ion chambers and portable geiger counters with which citizens measure, monitore and crowdsourcce real-time radiation data. Crowdsourcing of data via DIY tools serves not only the need for more accurate and independent data but it also empowers individuals and communities via the process of building such low tech tools with post-apocalyptic appeal. In a similar manner, another organization of artist and designers in Yogyakarta, Indonesia (HONF), is working for many years with both

local village communities and academic institutions to provide creative and open source solutions to their issues. These examples will help us elaborate on our main thesis that the Hackerspaces integrate community building with prototype testing and provide a more resilient model for society facing emerging technologies and various environmental and social challenges.

Introduction

"I had almost forgotten that we might establish an Academy of games or more generally, Academy of pleasures"

This famous quote from 1675 in which G. W. Leibniz expresses his future vision of the Academy of Sciences describes well the variety of functions and creativity involved in today's Hackerspace, Maker and DIY approaches to science and technology based on the open source modes. The various forms of bottom-up organizations that appear in recent years around emergent technologies, DIY subculture and novel forms of investment in innovation and entrepreneurship provide interesting case studies for understanding the relation between politics and design, new technologies and social movements that was present in this early idea of the ideal scientific research centre (Kera, 2010).

Whether we are speaking of the "R&D labs" that are part of some existing cultural and art centres such as Ars Electronica in Linz, ZKM in Karlsruhe, FACT in Liverpool, Laboral in Gijón, or alternative incubators like Hackerspaces, HUBs, MAKE fairs, DIYbio labs, or even developing world initiatives gathered around art organisations such as HONF in Indonesia, we are witnessing the crucial role of radical design and politics that are experimenting with new networks between actors and stakeholders. Communities of people monitoring, sharing and making sense of various "objective" and "scientific" data and protocols in their everyday life are actively exploring and performing the future symbiotic relations between various types of agencies across scales (molecules, traditions, social institutions etc.). In this sense they embody what Bruno Latour (2004) and Isabelle Strenger (in Latour, 2004) describe as "cosmopolitics". Political and social participation today is not only a domain of activities for humans but it also involves other agents that are "non-human" but can still influence our society in often unexpected ways.

These novel forms of community organised and financed science and technology labs revive the original idea on science, technology and public interactions envisioned by G. W. Leibniz in his famous "Odd Thought Concerning a New Sort of Exhibition (or rather, an Academy of Sciences ; September, 1675)". In this original

vision of the academy of sciences Leibniz ceases to discuss the advancement of sciences and technology in terms of metaphysical and philosophical issues of truth, limits of human mind or the nature of reality but defines science and technology by their ability to generate new ecologies of interest and influence, new institutions, networks and relations between different actors. Science, technology, business, art, entertainment, tourism are all part of an effort to raise human curiosity and wonder and to transform the society. Leibniz's prophetic vision was modelled after his ontology of monads and interactions between different scales which is exactly the main design challenge in emergent technologies. Leibniz's academy is becoming a reality today thanks to the global Hackerspace movement and various initiatives that use design prototypes but also art to experiment with these various scales.

The various functions of these spaces, from the more obvious like popularization and presentation to the more professional like investment in innovation and more creative and experimental, connect science with social experiments. These DIY and alternative places perform, foster and accelerate the ability of science and technology to serve different purposes and connect various actors in new networks and ecologies. The very democratic form of these institutions that support bottom-up and citizen science projects defines them as true cosmopolitica laboratories, and what is even more important cosmopolitics becomes an experiment with not only novel networks between actors but between various scales. We will discuss two case studies to follow how actors interact and what type of networks they build around these technologies and scales. While the first case study on "DIYbio in Singapore and Indonesia" will present two opposite models characteristic of the Asian Hackerspace culture, the second case study of Tokyo Hackerspace project on participatory monitoring of radiation will show how these models can merge and benefit the society.

DIYbio and Food Hacking in Singapore

While in 2008 and 2009 the DIYbio movement gained momentum in terms of popularity thanks to the "Quantified self" movement and synthetic bio activities related to Maker and Hackerspace community, the 2010 marks the start of the global DIYbio movement. In EU this translated into revival of bioart activities connected to various art centres while in Asia it proved productive in terms of research related to agriculture & food. The whole movement around the world identifies with the ideas of citizen science projects, low-cost protocols, lab equipment based on open hardware and shareable and reproducible kits. The common strategy of connecting the DIYbio labs to the local Hackerspace communities ("Biocurious" initiative, DIYbio projects connected to "Noisebridge" Hackerspace in San Francisco, DIYbio in NYC connected to one of the oldest Hackerspaces in the world "Resistor") is not widespread in Asia where it seems to follow the EU style squat and art centre strategy.

The first DIYbio event in Singapore (http://diybiosingapore.wordpress.com) was organized in July 2010 also took place in one of the first Hackerspaces in Asia. The

Singaporean Hackerspace.sg is based in the traditional Malay area of the city, Kampong Glam, which represents well the paradoxes involved in the local movement. Kampong Glam is known for its bohemian and very relaxed atmosphere even if its difficult to find a restaurant serving alcohol beverages because of the strict halal policy. It is however one of the most popular and authentic places in Singapore thanks to its unique ability to integrate and accommodate the most traditional and the most bohemian cultures. Western tourists, local expats and alcohol loving Singaporeans enjoy the authentic feeling of this place and simply develop a special strategy how to move around by having a dinner in one of the Turkish or Egyptian restaurants outside in the pleasant tropical night while enjoying the drinks later in the air-conditioned Blue Jazz café and club. The club is also used for the monthly Hackerspace events that introduce various interesting local businesses, research and creative projects, so called “blinkBL-NK” nights http://blinkbl-nk.com/.

The paradoxes represented by Kampong Glam mixture of religion and hedonism, tradition and innovation, are mirrored well in the local Hackerspace and DIYbio scene. The Singaporean DIYbio that started as a gathering of artists, philosophers and scientists “doing strange things in their bathrooms and kitchens” rather quickly transformed into “Biotech Start-up Nights” in the next three months. While in the original meeting people acquired some knowledge on how to hack rice cookers and create sous-vide cooking devices, how to shoot fly porn with hacked webcams as microscopes and support one local evolutionary biologist in his research, later meetings became networking sessions for the local (missing) biotech startup scene. Business and culture, government and community projects in Singapore do not exclude each other but they do not really support each other either. The whole dynamics surrounding the local Hackerspace and DIYbio movement repeats the paradoxes involved in the unique mixture of left and right wing politics that characterizes Singapore and which are well represented by the Kampong Glam area.

For example, the most serious activity of the Singaporean DIYbio became a rather geeky campaign against the government health program promoting balanced diet but not for reasons which we would expect in such anti-government campaigns which usually protect the rights of the individuals to choose their own diet. The local Hackerspace responded to the government “command” asking citizens to eat more veggies and grains with even more extreme technocratic and “scientific” advocacy for the so called “paleo diet” based on meat consumption and even molecular gastronomy techniques of “sous-vide cooking”. The main local proponent of the paleo diet and a sous-vide cooking guru, Meng Weng Wong, who is also one of the leading figures of the local Hackerspace, simply started a campaign against the “carbohydrates” conspiracy and other reliques of “agriculture”. He subscribes to the belief in the evolutionary connection between our genes and meat consumption which supposedly developed in the original hunter-gatherer society and which agriculture messed up with grains. For this reason, he decided to fight the government camping by organizing large sous-vide meat dinners and parties and using his blog to promote this diet by giving detailed descriptions of his cooking

experiments and techniques http://mengwong.livejournal.com/. The DIYbio in Singapore repeats and mirrors the paradoxes involved in Kampong Glam's unique bland of traditional and bohemia culture in this unique combination of paleolithic ideology and modern sous-vide technology, of very old food genes and very modern cooking practices, and also expresses the Singaporean uniqueness.

The Singaporean DIYbio interest in molecular gastronomy and issues of food and health are also a response to a fashion trend and nutritional discussions which are possible only in a very wealthy society. The most notable DIYbio initiative in the rest of Asia, especially in Indonesia and in the Philippines, have very different agenda but they also follow closely the EU model. The DIYbio experiments and events in EU are closely connected to the local squat and art centers and to the BioArt projects rather than to the Hackerspace ethos. These global DIYbio networks that are emerging in Asia for this reason offer two, almost opposing versions of how to involve the public, the citizens in science and technology development. While the US model of Hackerspaces and DIYbio labs is based on the ethos of entrepreneurship and independence from the strong state, which strangely is possible even in the technocratic Singaporean context, the EU model is based on publically funded art projects and the tradition of squat cultures. While in the US model of DIYbio, the citizens are basically shareholders in science and technology projects that have a potential to provide benefits to the early adopters, in the EU model, the citizens are more stakeholders that can have wide range of reasons and interests (often critical) in the biosciences and the biotechnologies. While the Singaporean DIYbio follows the US model in terms of its interests and models of work (Hackerspaces), the rest of Asia is more involved in the critical appropriation of biotech protocols that are closely connected to the strategies typical of the EU art centers and squats.

DIYbio flower revolution: Indonesia, Philippines & Japan

The most successful of these DIYbio activities in the rest of Asia is related to the famous art centre in Yogyakarta called "House of Natural Fiber" (HONF). In 2009 and 2010 they organized a series of workshops led by artists (Marc Dusseiller, Shiho Fukuhara, Georg Tremmel) in cooperation with the Microbiology Lab of the Agriculture faculty in the Gadjah Mada University (UGM) in which they hacked webcams and even Sony's PS3 Eye into digital microscope, used them as haemacytometers and bacteria counters and even explored various other alternative functions for micro-organism detection. They also worked on simple scientific protocols as a response to urgent social needs and protest tools against government policies. HONF's recent project "Intelligent Bacteria - Saccharomyces cerevisiae" was nominated for the prestigious Transmediale 2011 award because of this original use of scientific protocols as forms of a peaceful protest. The collective created a simple kit for alcohol brewing and distilling of Indonesian fruit as a response to the newly imposed tax laws which tripled the price of wine and even beer and pushed the local population into lethal experiments with distilling and brewing their own alcohol.

Similar to the initiative in the Philippines (Biomodd and BedroomLab), the DIYbio in Yogyakarta has a strange obsession with flowers and plants. While in the Philippines the plants are used for building future sustainable server farms (Biomodd), in Indonesia fruit and plants are used basically as a political medium for resolving social issues and questioning the global biotech networks. Following Japan, the flowers are even used for supporting the Creative Commons License in the first ever biopiracy protest flower revolution - the “Common Flowers: Flowers Commons” project. The project which started in Japan and Germany was only promoted in Indonesia but offers a very interesting case study of global biotech networks and the grassroot biopiracy response by developing nations around the world because of GM patents.

The Japanese and Indonesia biopirates basically reversed the “jailed” and genetically modified and copyrighted blue carnations and released them back to nature and to the land where these flowers originated and where they belong. Since these plants are officially considered not harmful, it is not illegal to release them into the environment, but the Japanese company that owns the patent decided to avoid public reactions against GM and outsourced their “production” to South America. The blue Moondust carnations were developed by the Japanese beer-brewing company, Suntory, as the first commercially available genetically engineered flowers, and although the company was granted permission to grow them in Japan, they simply outsourced the production to Columbia, from where they ship them as cut-flowers to the worldwide markets.

In the “Common Flowers” project the artist collective (BCL) reversed the plant growing process by technically cloning new plants from the purchased cut-flowers using Plant Tissue Culture methods. Using DIY biotech methods involving everyday kitchen utensils and materials purchasable from supermarkets and drugstores, they “freed” the GM carnations back into nature in undisclosed locations to support the idea of creative commons and even bio-sharing: “By freeing ('jail-breaking') the flower from its destiny as a cut-flower and establishing a feral and more 'natural' population of blue carnations, the flower will be given a chance to reconnect to the general gene-pool and to join again the evolution through natural selection. Common Flowers hopes to touch is the question of patents on plants and on lifeforms in general. In particular what form of legal protection for their plants was granted and does the act of simply growing plants constitutes a violation of Suntory's copyright. Is this reverse Bio-piracy?” (Fukuhara & Tremmel, 2010)

The more socially and critically involved hacking is typical for the rest of the Asia DIYbio scene (except Singapore) because of its close ties with the EU based initiatives. The best definition of this style of DIYbio hacking is given in one recent interview with the BCL collective that created the “Common Flowers”: “Hacking has to be effortlessly elegant. A small gesture with a big outcome. With Bio-hacking in particular we mean the attempt to regain the power about our shared biological destiny. We need to get involved, we need to understand, we need to learn. Not only we as artists, but we as a society.” (Gfader, 2010) The strategy of “small gestures with a big outcome” uses a non technological jargon to explain the basic

low-tech and high-impact strategy of the DIYbio movement which in the Asian context uses scientific protocols are used as a form of political protest and social empowerment and not only as a medium for technological progress and scientific advancement. HONF as a new media art laboratory running ever since 1999 in Yogyakarta implements such simple, community and open source based technologies to improve the daily lives of people there and agriculture is a very important part of this. Also in the Philippines, the DIYbio activities that are just starting around the SABAW Media Art Kitchen and their "BedroomLab" workshops and meetings are targeting agricultural "hacks" in the form of urban farming, bio-fuels and solutions dealing with ecological issues. The interest in plants and digital technologies that we can follow in all local projects is becoming something of a distinctive sign of the Asian DIYbio scene.

Even the very successful Biomodd [LBA2] Philippines project that was started in 2009 as an art initiative by a Belgian artist Angelo Vermeulen works with the idea of bringing plants and computers together for socially and ecologically sustainable future. The Biomodd project started as an art idea that soon developed into serious, community driven research project into issues of symbiosis of biology and electronics as sustainability solution. Through a partnership with the University of the Philippines Open University (UPOU) and a whole range of Filipino cultural partners with more than 100 Filipino artists, scientists, engineers, gamers, craftsmen, volunteers and students, the project was able to attract a critical mass which turned it into an international success story supported by the famous TED foundations. Over the course of eight months an installation was created that literally fused a living ecosystem of plants with a modified computer network. The monumental sculpture contains system of recycled computers intertwined with an aquaponics system that serve as cooling devices for the computers use for various games etc. The synergy between technology and biology brings together computers, algae and plants but also various people that took part in this open source educational and art project which involved the public in a serious ecological debates about the sustainable future.

The DIYbio movement in Asia is socially oriented and driven and involves actors that are closely connected to local even indigenous cultures. We can clearly see this in the case of the "Intelligent Bacteria - Saccharomyces cerevisiae" project by the HONF collective. The project is offering a solution to a serious social problem related to the unsafe and unsterilized alcohol production that leads to dangerous methanol poisonings which are killing people in Indonesia on a monthly bases. Due to the regulation from the Ministry of Financial Department that increased duty on alcohol in April 2010, local traditional alcohol drinks became popular again and started to appear in the markets in large quantities, often containing very dangerous methanol substances. Artists together with researchers at the Microbiology department of UGM in Yogyakarta conducted a research in introducing a proper and safe fermentation technology for the general public. The DIYbio in Indonesia basically democratized a science protocol that will make the home fermentation of alcohol safe. This protocol supports an old tradition of fermentation that is more part of the indigenous cultures in Indonesia rather than the official religion. Through

a publically available kit and instructional video the artists and scientists involved in this project are trying to connect traditional knowledge of brewing with modern technologies that make the production of alcohol safe but also to open to discussions. The project has an artistic aspect in the form of an acoustic installation that responds to the high number of poisonings and deaths of alcohol consumption in Indonesia. What makes the project outstanding is how DIYbio and open source approach to science connected contemporary art strategies with local and traditional knowledge and culture. This offers a specific form of science communication based on appreciation on local and traditional knowledge and culture related to alcohol production and knows how to connect them with modern technologies and methods.

These examples of experimental form of research, investment and even artistic creativity show clearly how the “low-tech but high-impact” logic of the DIYbio movement operates in various contexts and how it can connect science, culture and society in ways that traditional STS policy discussions could not even imagine. The artistic and scientific solutions and protocols are affecting but also involving large groups of citizens and stakeholders in the process of the research, creation and production. Whether in USA, EU or Asia the DIYbio revolution involves open source laser cutters and other open hardware tools that can create cheap lab equipment, synthetic biology recipes and other protocols that spread like cooking recipes, self-organized clinical trials and other community related projects that are challenging not only in technological but also in social sense. The strategies and interests of these groups are starting to converge into one informal “pop biotech” network between ASIA, USA and EU that is very different from the official flows of knowledge and expertise in the biotech industry but which also reflects many of the common issues and problems with biotechnologies.

Tinkering, Policy and Fetish: DIY radiation monitoring in Japan

Tokyo Hackerspace response to the Fukushima nuclear disaster presents a unique convergence of the two models of Hackerspace communities which we are witnessing in the region. The Safecats project which was initiated shortly after the disaster and the activities around so calle open source humanitarian hardware connected the enterpreneurial spirit of the US model with the humanitarian and community oriented suqt model we mentioned earlier which is also present in Japan. Participatory sensing of radiation in Fukushima via DIY tools was both a design response to the challenges of gathering correct data and understanding the spread and effects of radiation but also political means for social action and even personal fetish objects for dealing with uncertainty and trauma. The DIY and open hardware aspect of building low tech tools added to the personal, social, and public sensing activities an aspect of healing and catharsis related not only to the collective trauma but also to a situation of extreme uncertainty.

The radiation crowdsourcing collectives gathered around the Pachube platform, Maker magazine and DIYbio movement paradoxically embody both the concepts of ‘reflexive modernisation’ in which citizenship is reduced to scientific practices and

constant risk calculation and ‘pre-modern cosmopolitics’ in which new configurations between humans and non-humans form political and evolutionary systems. These movements connect technological standards with deliberations on social action in a global and day-to-day context over the internet and various DIY tools and they allow plural and alternative versions of future communities to co-exist with various ways and views on how to connect politics, technology and nature. Control and decision making (in terms of monitoring, reflecting and self-organising) are instantly connected to scientific facts and technological standards via these design prototypes, which are political and technical at the same time. Design in the case of radiation data becomes a form of participatory and collective action redefining the meaning of global and local communities but also of the relation between lay people, science experts and political representatives. Furthermore, these tools are also a type of ritual object that allow individuals and collectives to deal with the uncertainty on symbolic levels, creating a hope that we can design tools which will help us deal with new challenges. Interaction across scales over these DIY tools becomes a very personal but also collective dialogue that happens on molecular and even atomic levels between humans and non-humans with social, political and scientific implications. These post-apocalyptic collectives around citizen science projects related to the Fukushima disaster define politics as a form of design and in terms of practices that negotiate the relations between various scales through probes and prototypes rather than by repeating discussions on policy and scientific facts. Rather than defining the future collectives in terms of risk, discipline, normalization, biopolitics or cosmopolitics, citizen science projects using DIY tools are pragmatic and plural collectives with various, often conflicting goals and aspirations.

The function of these data exchanges surrounding atoms, molecules and humans is not only a matter of risk management nor only an effort in citizen emancipation in terms of getting accurate data for possible social actions. The participatory monitoring over DIY Geiger counters and similar low tech solutions generate rather than tame the uncertainties because they show how difficult and maybe impossible is to get accurate data about the situation and decide on the course of action. In this sense, participatory monitoring is not only about crowdsourcing data but rather dispersing individual and collective anxiety, hopes and fears. It is a therapeutic device rather than policy mechanism, a form of post-apocalyptic ritual of catharsis and healing with elements of protest and reflection.

DIY open hardware tools as means of participatory monitoring are modern day fetishes and power objects that have ability to connect anxiety and hope, symbolic and real power over the circumstances, scientific (objective) data with primal human emotions. With these radiation monitoring devices we can embrace the return to nature but also go in the opposite direction, develop a carnivalesque attitude to catastrophe and death and an almost post-humanist relation to the radiation levels which we see in some of the projects •move to references(“Tokyo Radiation Levels” project by Steven Danieletto on www.facebook.com/Tokyo.Radiation.Levels or Tokyo Kids& Radiation community www.facebook.com/pages/Tokyo-Kids-Radiation/227762067240468). Even the

Geiger counter hardware put to work by Safecast.org brings together an array of functional elements, literally lashed together into an assemblage to orient data users toward uncertain futures. Data gathering as a risk technology can be understood as helping create the primary distinction between risk and risk perception (e.g. Douglas and Wildavsky 1983), but the crucial element is that risk and risk perception are not qualitatively distinct but rather are replications of each other. There is no risk per se without a perceptual apparatus, since risk implies partial knowability in which a decision must be made (inaction also entails a decision with its own hazards). And the perceptual apparatus produces its own uncertainties and can only be used with the acceptance that more information may make decisions much more difficult which seems to be the case in the participatory monitoring projects around Fukushima.

FETISH DIY OPEN SOURCE HARDWARE

The technology of perception replicates the relations it is designed to measure, and measurement, if it is successful, translates the external patterns into new media. It creates not a representation but an image as a new object that is opaque and must be interpreted. When contamination data points appear on an online scalable map there proliferates a range of critical connections between the map layer and the terrain layer it replicates. They are each their own artifact, contingent in their own particular ways, a point made obvious when one realizes the specificity of mounting the measuring device to a moving vehicle, hence taking measurements perhaps a meter above the road within specific air conditions, isolated from soil or other localized characteristics that can influence the measurements. These aspects are not a criticism at all—it may be that this relative isolation has the virtue of producing relatively consistent measurements. Rather, the point is the artifactual basis of the map layer that must be taken into account through a series of design decisions, essentially through what Paul Edwards (2010) calls ‘data modeling,’ that is, the retrospective analysis of measurement techniques to rectify the limitations of practical contingencies. Hence there is a very detailed attention to how measurements are taken, what devices are being used, how they have been calibrated—essentially an attempt to stabilize some working relationship to numbers which, in isolation, are relatively meaningless. What participants in these monitoring projects demonstrate is an intuitive awareness of these contingencies, which produces a sober sense of what data can be used for. Whereas for some users, perhaps less aware of the issues surrounding risk and perception, specific measurements taken in isolation can produce tremendous anxiety or a sense of determined outcomes that cannot be influenced by the actors’ decisions, data collected within Safecast’s technical assemblage must be used comparatively, i.e., with reference to relative values taken with comparable methods. Awareness of the uncertainties of data collection and perceptibility produces a more restrained sensibility surrounding risk and contamination because the data image is (yet) another artifact that must be viewed with a degree of skepticism in the form of awareness of its limits.

The DIY objects such as iGeigie brought together into a functional assemblage of iPhone with Geiger counter retain an aesthetic of minimalist pragmatism, they likewise bind together deeply symbolic forces, as if attracting to the precise locus of "nuclear society" (uncannyterrain.org) all of its most crucial elements for survival. The Safecast apparatus involves binding together a Global Positioning System receiver with the Geiger counter managed through a Arduino controller, mounted to the outside of an automobile with a data card (memory stick or SD card) that makes data quickly portable to the internet. Within a DIY context, this is a contemporary version of the nuclear shelter, calibrated not in the 'closed,' sealed risk environment of the bunker stocked with canned foods but in the open systems approach of managing uncertainty through abstraction, knowledge, mobility and portability.

The collaborative attention to food is telling. Uncannyterrain.org, a documentary film project loosely networked with Safecast, uses Safecast data to inform their exploration of food contamination and organic farming. Strikingly, an ethic of openness extends even to contamination, at least in some cases, what one baker refers to in terms of coexistence. As the filmmakers write: "Ohashi may need to look outside Fukushima now for organic suppliers for his bread. He says we need to learn to coexist with radiation. Suzuki and Fukumoto are leaving the idyllic farming community of Kaidomari to live in balance with nature elsewhere. Hongo won't sell his potentially contaminated rice this year, but he's eating it himself. Yoshizawa wants to save his 300 irradiated dairy cows from a death sentence." (http://uncannyterrain.com/blog/2011/07/25/carry-on_fukushima/) All of these decisions imply a commitment not to nuclear technologies but to living in light of their consequences within a vision of nature that combines coexistence and compassion with the patently not-natural and pervasive radiation. In this sense, DIY monitoring tools are not media for assessing our situation and creating a public pressure on some policy makers or even protesting against the circumstances. These tools do not serve only rational goals and needs but they are also means of that carnivalesque, ironic and semi-magical interaction which Brenda Laurel calls "designed animism" reminding as that data are never passive representations but triggers for action: 'Sensors that gather information about wind, or solar flares, or neutrino showers, or bird migrations, or tides, or processes inside a living being, or dynamics of an ecosystem are means by which designers can invite nature into collaboration, and the invisible patterns they capture can be brought into the realm of the senses in myriad new ways." (262). These DIY fetishes are tools of negotiation with the non-human forces in ways which are not only scientific (calibration), or political (protest) but also deeply personal and even spiritual (therapy, reflection, irony).

The anthropological fascination with fetish objects struggled with a primal problem in Western epistemologies, namely the association of symbolic and material realms, whereas in at least some of these practices the association appears rather as powerful spiritual technologies operating through elemental materials bound together in figurative form (Mauss 2001; Pietz 1991). Currencies such as cowry and glass, technologically powerful objects for binding, piercing and reflecting, powerful figures forged or carved as rulers under public gaze or in secrecy. DIY open source

hardware uses powerful objects from the official market place and transforms them into alternative, low tech and imaginative uses that open new possibilities of interaction. Modern artists' primitivist focus on African sculpture paralleled anthropologists' attempts to comprehend the human through a 'return,' however problematic, to basic forms of social organization and spirituality, often replicating the old Western assumption that the spiritual in some form, even mythical, is a requirement for society (e.g. Durkheim 2001). Designers of these DIY tools face similar dilemmas in which environmental uncertainty itself becomes the format for social organization and a kind of spiritual focus. But rather than comprehend real non-Western societies' complexities, the scientized approach in anthropology and in art was organized around intense abstraction, borrowing from the abstracted forms of African and other non-Western ritual and visual representation. Whatever the primitivist associations of this dramatic mental engagement, whose contradictions Claude Levi-Strauss (1966) captured so well with the phrase la pensée sauvage, the procedure nonetheless correlated with attempts to isolate the minimal variables of human existence across biological, social and spiritual domains. In this sense artistic and ethnographic experimentation with abstraction can be viewed as experimentation with the human form, a re-imagining of the possibilities of existence or a sort of science fiction written against ethnology as technological innovation. The project of determining what constitutes Man, in some quarters, was an attempt to provide a positive answer grounded in determinate forms of knowledge, but in other quarters it provided an experimental platform meant not to inscribe but to liberate. Its mode of imagination is open. It takes the form of awakening to possibilities. A "what if… ?" approach to critical design and active embrace of "design noir" (Dunne & Raby 2001) insists that our tools are not only metaphors for our unconsciousness but symbolically powerful instruments with which we actively explore the aberrations, transgressions and obsessions in society and nature. Canivalesque and therapeutic design is an affirmative celebration of the "Unpredictable potential of human beings to establish new situations despite the constraints on everyday life imposed through electronic objects". DIY Geiger counters and similar participatory devices are typical "Noir" and fetish products, they are "medium that fuses complex narratives with everyday life… a fusion of psychological and external `realities', the user would become a protagonist and coproducer of narrative experience rather than a passive consumer of a product's meaning…. Imagine objects that generate `existential moments' - a dilemma, for instance -which they would stage or dramatise. These objects would not help people to adapt to existing social, cultural and political values. Instead, the product would force a decision onto the user, revealing how limited choices are usually hard-wired into products for us. On another level, we could simply enjoy the wickedness of the values embedded in these products and services. Their very existence is enough to create pleasure." The carnivalesque and therapeutic dimensions of a ritualized practice of moving through contaminated spaces as an active technological reflection on environmental uncertainty raises a range of performative and experiential practices associated with the use of the heterogeneous ritual assemblages. Yet the fundamental supposition that spirituality binds together the social form of anthropos remains intact if we view environmental uncertainty, with

its quality of transcendental unknowability, as the spiritual content of these practices.

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Biocurious http://www.biocurious.org/
Biocurious Kickstarter page http://www.kickstarter.com/projects/1040581998/
Biomodd [LBA2] Philippines project http://www.biomodd.net/lba2
BioWeatherMap http://www.bioweathermap.org
BCL http://bcl.biopresence.com/journal/tag/comflow/
DIYbio http://diybio.org
DIYbio NYC http://diybionyc.blogspot.com
Hackerspaces http://hackerspaces.org
Hackerspace Singapore http://www.hackerspace.org
HONF http://www.natural-fiber.com
Patchube http://www.pachube.com/
Safecats http://blog.safecast.org/
Singapore DIYbio event http://diybiosingapore.wordpress.com
Tokyo Hackerspace http://tokyohackerspace.org/