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Of RFIDs and Arphids: The Logistics of the Future

ByAnthony Alexander

Bruce Sterling, techno-prophet of the *Wired* school, was recently in London prophesying the future of RFID technology. Seeing beyond its crucial role in managing the logistics of commodity flows within just-in-time production, Sterling imagines RFIDâs ability to provide a design fix for our ailing planet. Anthony Alexander reports on his latest version of a âdonât look backâ populist and market oriented environmentalism

RFID tags. Those square metal spirals in stickers providing high-tech inventory control for warehouse logistics. I keep seeing them stuck onto the pavement on the high street, ground down by passing feet. Have they been deliberately put there by itinerant agit-prop art activists to subtly raise awareness? There is a widespread idea that recent years have seen the shadowy rise of a potentially malign tracking technology. The SPACE Media centre in the East London borough of Hackney, is one of some 16 sites operated by the artists' charity SPACE Studios, co-founded by the pioneer of op-art Bridget Riley in 1968 together with Peter Sedgley and Peter Townsend. This May, the centre played host to science fiction author, cyber-visionary and occasional scenario consultant, Bruce Sterling, as part of a series of events forming their year long Tagged season. So far this has involved workshops for young artists, teaching the technological principles at work inside RFID tags, talks and discussions as part of the NODE: London festival and the commissioning of three art works in Autumn 06.

bruce sterling
picture >> Bruce Sterling Rant @ Space "ARPHID NOT RFID"

Tagged was partly inspired by Sterling's promotion of RFID technology. First invented by MIT, it was given a huge boost in 2004 when the Pentagon and Wal-mart required their suppliers to 'slap and ship' RFID tags onto their products to improve logistical efficiency. Sterling pointed out that this means every company of any significance in the US has now adopted RFID. âIf you are in industry or commerce and you don't deal with Wal-mart or The Pentagon you technically may as well not exist.â RFID tags are in the first instance the next evolutionary step of the barcode, allowing the contents of whole cargo containers, trucks or warehouses to be instantly logged.

This in itself is generating âa tidal wave of data.' The movement of products from place to place, including over international borders, contributes to Pentagon efficiency and Wal-mart's bottom-line in huge and largely commercially confidential ways. But in another sense RFID tags represent the first steps towards radio-linked processors that can be cheaply embedded in objects. The next-generation âGen2â chips produced by Hitachi are smaller and far smarter. Little larger than a full-stop they can read and write up to 8 kilobytes of data. 25 years after the ZX81 hit the streets of Britain the processor inside it has shrunk to the size of this full-stop. If you can get a couple of them talking to each other you might be able to get them to run a microscopic parallel-processing emulation of Manic Miner or Jet-pac! Sterling maintains, âWe're in the position now of people talking about modems in about 1981.â Ebay auctions, Google Earth or ipods would sound like pretty far-out sci-fi ideas from that perspective.

Sterling believes the future of computing and the future of the internet will both enter radical new phases due to the growth of RFID. The significant thing is not so much that objects can be remotely tracked, James Bond-style, but that they can be linked to databases. The terminology of Everyware, Ubiquitous Computation and Ambient Findability all reference books and research programmes out there. Clearly this will eventually lead somewhere more interesting than the Ray Bradbury inspired MIT House of the Future where your fridge starts giving you diet tips.

Today, simple forms of RFID are widespread in the UK, way beyond the more familiar packaging systems. Firstly, via the ubiquitous Oyster card aimed at improving the logistical efficiency of passengers on London's public transport. Then, electronic patient records in hospitals and of course the Home Detention Curfew scheme for non-violent criminals. This last example is perhaps the most controversial in terms of civil liberties in the digital age, but Sterling argues that imprisonment itself is as old as the hills. The big money for RFID is retail data-mining: tagged shopping trolleys might provide fascinating data about how people move around large supermarkets, and Wal-martâs computer wizards are second to none, honing just-in-time inventory control to new levels of sophistication. Despite Sterlingâs nonchalance however, the tagging of people seems substantially different from the tagging of products. US RFID manufacturer Verichip has been desperately trying to expand the long-established market for tagging pets and livestock by implanting RFID chips into tragically-hip night-clubbers in Spain and Scotland â offering the ultimate combination of fake VIP status and drinks promotion, in return for priceless media coverage. They have also suggested they could tag bodies after disasters, or foreign nationals entering the US on short-term work permits. Of course, RFID is not alone in being a new technology of high tech surveillance, as a number of mobile phone tracking services show (see, for instance, <www.childlocate.co.uk> or <www.followus.co.uk>), but significant concerns about RFID in ID cards, office swipe cards and high-tech car keys can be seen in recent coverage in The Register and Wired. Firstly, the competence with which decision makers can judge advice from information technology consultants regarding anything to do with databases and security. Secondly, the relative ease of scanning and cloning RFID chips. Embedding hard encryption is one possibility, but this debate is still ongoing.

A significant factor in RFID technology is that it has been imposed on society from the very top of the industrial food chain. There has been very little of the bottom-up development that characterised early computer programming or the dot com era. No wonder then that it is regarded as a shadowy control mechanism being imposed by dark forces to herd us towards a techno-dystopia. One especially wry observation Sterling makes is that the corporate sector is far more worried about the backlash from Christian fundamentalists convinced that RFID is the mythical 'mark of the beast', than they are of that from pessimistic cyber-theorists and media artists.

Sterling has been trying to foster an open-source ethic towards RFID, by inspiring computer scientists, hackers and media-artists to move into this space. The computing avant-gardeâs investigation into RFID has partly descended from its long-established interest in tiny disposable processors in objects. However, because RFID was initially designed to improve the lives of retailers it seems to have a very different nature from the wide variety of uses to which computer programming can be turned. âBig-box retail doesn't really approve of people playing around with RFID technologyâ he admits, âjust as they wouldn't approve of people playing around with barcodes. They see it as their domain.â But what about the next generation 8K processor RFIDs? What will they be used for? âMost retailers haven't figured this out yet,â Sterling says, âbut that's because they are not as smart as Wal-mart. Wal-mart knows â but they aren't telling anyone yetâ

That the future of computing is being worked out in high-tech labs by big corporate players creates an anxiety in the minds of old school computer and internet programmers. For the digital underground to posse up in the face of a potentially 1984-like society seems a natural and even romantic response. In order to differentiate such grassroots efforts from those of the corporate heavy hitters, Sterling recommends using the term 'arphid' so they can be easily picked up by search engines amidst the dense fog of mainstream RFID sites. A quick overview of current 'arphid artists' included Nancy Nisbet's Exchange Project, a trade activism piece designed to draw attention to the cross border traffic of RFID, Project Urban Eyes, which tags and tracks the routes taken by city pigeons, as well as various works by Meghan Trainor, who has her own subcutaneous tag, and several others covered by <http://we-make-money-not-art.com/> and <http://www.rhizome.org/>.

RFID technology touches on certain themes that may in themselves be the subject of artistic endeavours, such as surveillance or transnational commodity capitalism. Artists like Paula Roush have made pieces explicitly about RFID, such as Arphield Recordings, a collection of ambient soundscapes and other musical explorations based on the beeps of Oyster cards being swiped. However, for any artists wanting to use the RFID technology itself, cost is the first barrier to entry. As part of their Tagged programme, SPACE Media purchased a set of RFID scanners and tags for use by their artists and workshop participants. For others, Sterling recommended ebay, and an audience member even suggested that self-build kits are currently being made.

The second barrier is how to actually make them do things. All RFID development requires a huge amount of middleware â what Sterling calls âthe confluence of many hellsâ. The RFID projects thus far co-ordinated through SPACEmedia have benefited from the backend skills of open source programming group <http://goto10.org>. Partnerships between the media art world and the broader open-source programmer community are also being encouraged by a strategic partnership between SPACEmedia and the Human Computer Interaction department at Queen Mary College London.

Although the open source ethic is not irrelevant to the lack of transparency in Gen2 RFID developmnent, Sterling's main interest in RFID technology though is not in endlessly revisiting issues of cyber-paranoia. Certainly, RFID is spreading fast through the world â it is used to enable product recall and many countries have now included it in passports. But at one point during the Q&A session when the subject of cyber-security cropped up again, Sterling replied with exasperation, âReally, global warming is about a million times more importantâ.

Sterling's recent non-fiction design manifesto *Shaping Things*, published by MIT Press, begins by stating that the book âis about created objects and the environment, which is to say, it is a book about everything.â The environmental awareness once promoted by a minority of radicals at the fringes of society is now widely felt to dominate every aspect of all our lives. The simple reality is that industrialisation causes climate change. It is in fact, the greatest ever unforeseen consequence of new technology. Repetitive strain injury and radioactive contamination fade into the background against the simple design flaw that the use of oil, coal or gas emits greenhouse gas pollution that natural systems are no longer capable of dealing with.

The first people to take this position were the 19th century pastoralists such as Wordsworth and Ruskin, who had an aesthetic reaction against the industrialisation and urbanisation seen in nearby Manchester. Blake's dark satanic mills were both the engines of modernity but also gateways to hell. Not just it seems for the workers inside them but, a century or two later, for those who will suffer the impacts of climate change. By the 1960s, ecology was a central pillar of the counter-culture of the Western World, taken as proof that a radical alternative way of life was needed to ensure Spaceship Earth would continue without losing control. Unfortunately, the very radicalism of the alternative lifestyle suggested meant that their arguments would not be listened to or taken seriously by the very people who controlled the industrial and economic system.

For Sterling, contributing editor of *Wired* magazine and darling of the US technology sector, climate change is a problem of dysfunctional design. Recently, the world of US style magazines, such as *Elle*, *Vogue* and *Vanity Fair*, and a number of New York design fairs have embraced the concept of 'haute green'. Disengaging with the issue as something to do with hippie hair-shirt values, Sterling represents a pragmatically pro-technology and optimistic approach to climate change. In *Shaping Things* he argues that there is no way back for industrial modernity, only forwards. âA small, beautiful, modest, hand-crafted society, living in harmony with its eco-region, relentlessly parsimonious in its use of energy and resources, can't learn enough about itself to survive.â Forfeiting the onward and upward drive of science and progress, argues Sterling, ultimately means losing the ability to adapt to climate

change, or anything else unanticipated that nature or our own natural tinkering produces.

This ’don’t look back’ approach applies to RFID too. He belittles protestors to RFID technology as hopelessly naive about how and why RFID technology has come into existence (not to mention the anti-modern values of the anti-RFID campaigners that are fundamentalist Christians). But he also argues (in his book at least, though sadly on this occasion, not to those present at this talk) how the idea of RFID technology offers hope for a new evolutionary step in product development and Life Cycle Analysis. The ability of RFID to link physical objects to digital networks potentially allows for a new form of waste management. Administrators of the new European Directive on Waste Electrical and Electronic Equipment may be interested to know how an embedded RFID tag could contain vital information on the demanufacturing of an object. At present, such things as old computer monitors are now legally classified as hazardous waste (due to the presence of heavy metals). Knowing who to call to collect and dispose of it may be greatly enhanced by RFID technology.

Climate change, as well as resource wars and species loss, point to a global technological system completely overwhelming the natural boundaries of our planet. Sterling sees the internet as the only global tool we have capable of helping to solve this problem. He sees RFID as having the potential to link our massively inefficient and entropic industrial cycles into digital networks that will allow us to collectively scrutinise and remodel them. His concept of the ’spime’ (a contraction of space and time, and incidentally not unlike ’spine’ â reminding me of the 4-dimensional perception of Kurt Vonnegut’s *Slaughterhouse Five or Donnie Darko*) refers to objects plus their histories and futures. Perceiving them as process as much as artefact involves adding information content.

âIdeallyâ, Sterling says, âobjects should be tagged when they are still blueprints. The tag could then include the blueprint.â When we decide to literally throw something away all the information about what it is composed of and how to ’demanufacture’ it is easily available. William McDonough and Michael Braungart’s cradle-to-cradle concept of design is of course relevant here because it conceives of a system in which there is no overall waste, converting the output (or waste) of one system into the input (or nutrition) for another system. Sterling’s most lively vision of where this might ultimately lead was provided by the recent growth of fabricator technology. TheÂ MCP Realizer is one example of an emerging field where fully functioning unique artefacts and machines can be manufactured to order by computer-controlled laser cutters. For MCP the feedstock is metal but there are other examples in which plastic is used. With fabrication technology, the spime idea of an object as design blueprint plus information cloud means that ultimate recyclability may be achievable.

It is clear that the rate at which new technology is transforming society means what was once science fiction is now everyday. Issues relating to technology and information are now so common that for artists to not react to them would be to ignore the real world. But for Sterling the real concern must be for a sustainable future. The growth of mainstream RFID and the underground arphid artist will both continue to evolve in ways that are impossible to pre-judge. In the short term we can look forward to news of SPACE Media’s Tagged commissions in July 06 and much more from the worlds of microscopic computing and spime-wrangling in the months and years to come.
Bruce Sterling’s blog Beyond the Beyond is at <http://blog.wired.com/sterling/>