FCJ–139 Sand14: Reconstructing the Future of the Mobile Telecoms Industry.

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Which is farther from us, farther out of reach, more silent – the dead, or the unborn? Those whose bones lie under the thistles and the dirt and the tombstones of the Past, or those who slip weightless among molecules, dwelling where a century passes in a day, among the fair folk, under the great, bell-curved Hill of Possibility? — Ursula K. Le Guin, Towards an Archaeology of the Future

Prologue

I was researching how the future gets imagined and made in the mobile telecoms industry, and had been since 2003. But I stood in a cloud on a remote Scottish island, rain refusing to fall, only seep through waterproof layers to my skin. Laid out before me were the foundations of a Neolithic village, five thousand years old. Its remains were marked by upright, glistening flagstones and low-turf walls; a square hearth before me filled with burnt-orange gravel. My chilled hand curled around the curves of a strangely shaped carved stone ball, its polished granite-pink surface carved with odd nodules. It was a replica of a Neolithic carved stone artifact found nearby. My thumb moved around and over the carvings as though caressing a mobile phone, fascinated, imagining.

Here, in this landscape filled with five thousand years of technology, in the islands of Orkney off the north east coast of Scotland, different futures became possible. Here I could imagine the making of mobile telecoms futures that were un-imaginable before. Previously, in the major mobile phone company near London where I had conducted my fieldwork, the future was

ubiquitous, the same everywhere. Here, I could make a mobile telecoms future that resisted such tropes of ubiquity and universality. Formed in the freezing rain, prehistoric archaeology met and merged with ethnographic evidence, and a different mobile telecoms industry could take shape. Not a science fiction, but an evidence-based future condensed in the rain by an ethnographic method that worked together the uncompromising sociomaterials of evidence with the always-necessary creative work of the imaginary; a method to make an ethnographic account of how other futures are *possible* in the mobile telecoms industry.

This paper is not simply one account of how the future is made in mobile telecoms, but a practical and political experiment to create a mobile telecoms company that does the future differently. What follows is the making of the ethnographically imagined mobile phone company, Sand14, and its possible futures.

Method – Future Archaeology

Sand14 is the effect of an experimental method (Law 2004). As I stood in the rain before the remains of the prehistoric house I enacted a thought experiment. In my ethnographic imagination instead of a square hearth filled with gravel, I saw a glowing metal stove throwing out heat; in place of the flagstone foundations, I saw a stone building rising up into a grass-covered dome; instead of standing in freezing wet air, I stood in a white kitchen with corkboard walls covered in documents and artefacts from my archive. I stood in Sand14, a version of a mobile telecoms design studio constructed from my evidence and recombined into a new form.

In my reconstruction the walls around me were filled with the hundreds of artefacts and documents I had collected from my fieldsites in the mobile telecoms industry between 2003 and 2007, and all the notes and drawings from my four ethnographic notebooks. I could hear the voices of designers in the company, their words a repetition of those I had heard and recorded during my fieldwork:

"I create memories [is the intent of the concept]," explained one voice from the design studio.

"Memories need simplicity, clarity. Just the right memory... [We need to] help people re-experience their memory... other people's memories," said another.

Sand14 was literally made from my evidence in what Donna Haraway might call a material-semiotic experiment; an experiment that acknowledges the inseparability of epistemology and materiality; that knowledge is always made, and made in situated practice (Haraway 1991). Situated futures are located in the epistemology and geography where they are made. The future is foreclosed and stabilised through practices such as standards-making, classification, organisational strategy, prototypes, demos, technology stories and so on (Bowker and Star 2000; Brown, Rappert et al. 2000; Bloomfield and Vurdubakis 2002; Bloomfield 2003; Rosenberg and Harding 2005; Suchman 2007). Drawing on a well-worn strategy from science studies and feminist technoscience my method understood the future as a situated knowledge made in ongoing and often difficult sociomaterial practice (Watts 2008; Adam 2009). Following Haraway's optical metaphor for knowledge-making my experiment was a diffraction of ethnographic evidence, one that was open and unashamed in its generation of knowledge that was both creative and empirical. I resonated with the politics of diffraction: a resistance to reflections that reproduce the same pattern of knowing elsewhere; and a commitment to the generative work of diffraction, of making a difference in the world (Haraway 1994, 1997). Sand14 was the result of this diffraction experiment. It was the interference pattern.

Ethnography is always a matter of partial connections and patterns, as anthropologist Marilyn Strathern has argued. Ethnographic accounts are always parts that are never just parts of some pre-existing whole (Strathern 1991). One cannot reconstruct a whole culture from ethnographic pieces. Fieldsites are not 'out there' ready for representation, rather data is created and curated during fieldwork as fragments. But such fragments can never be reconstructed into some complete whole. There are always gaps, slippages. All that can be done is a generative, and therefore creative, form of reconstruction; the bits and pieces fitted together one way or another (but not just any way, evidence has edges and boundaries that go together in some ways and not others). My method resonated with archaeology, with the generative potential of pot sherds and stone remains that can never be fitted together to say how it was in the past, but only how it may *possibly* have been, given the partial evidence. Just as archaeology reconstructs, and so generates the past from fragments of evidence (Shanks 1992; Pollard 2004), so a 'future archaeology' reconstructs and generates the future from fragments of evidence. Reconstructing my evidence was a significant part of my ethnographic research.

That ethnographic accounts are generative rather than descriptive is not new, of course. Ethnographic fieldsites have long been argued as not found but located and made (Gupta and Ferguson 1997); as a poetic juxtaposition of collected evidence and writing (Clifford and Marcus 1986; Clifford 1988); or, as an effect of the translation back and forth between fieldwork and deskwork locations (Strathern 1999). But, for me, located-ness implied that place was also an effect. It, too, had to be done. There was nothing a *priori* to place. In ethnographic writing the writer has to make a place as part of their account. For sure,

there are crucial matters of veracity and integrity, of politics and empirical commitments. To be clear, my argument is not for a reduction of place to semiotics, or for any floating disembodiment, but rather the inverse: a method that takes the embodied, visceral and performative effect of place as a matter of material-semiotic agency.

This is not a theoretical sleight of hand, but an experiment with particular apparatus and parameters. Philosopher of science, Karen Barad, argues for an agential realism, where an experimental apparatus has agency with ontic effects: change the apparatus and the world is made differently (Barad 1999, 2007). For me, the apparatus that diffracted the future of the mobile telecoms industry also had to include geography as much as epistemology. Change the place, and the future of the mobile telecoms industry must be made differently. Landscape has agency in future-making. Place can 'kick back' (as Barad puts it). If futures are made, then they are made differently in different places. The particular location of Sand14, in amongst the standing stones and prehistoric monuments of the 'Heart of Neolithic Orkney' World Heritage Site, was the apparatus that diffracted my evidence, collected from inside the tinted glass walls of the mobile telecoms industry near London. Orkney made the mobile telecoms future differently.

Sand14 was the enactment of the method I thought of as future archaeology. It was one possible reconstruction of my evidence, diffracted through one particular place. However, it was possible to diffract my evidence in many different ways, via many different places. So, why Orkney and not elsewhere? Why conduct this experiment in future-making using the Orkney Islands as apparatus?

The answer was literally in the walls. It was in the ethnographic fragments, the torn out magazine pages, the highlighted notes, all the print outs mashed up on the corkboard from floor to ceiling in my reconstruction. For my method of future archaeology was localized to my research in the mobile telecoms industry. It was not off-the-shelf and applied, not a universal passkey as philosopher Michel Serres might say (Serres 1995, 92). The method was as much an effect of my fieldwork as my evidence.

In the walls I could see two distinct groupings of my ethnographic evidence, two particular characteristics of the future in the mobile telecoms industry. I had woven my evidence through a flatter, more recognizable ethnographic method, into two key ways in which my fieldsite made its future. It was these two qualities of future-making in mobile telecoms that my method of future archaeology kicked-back at. It was these two futures that Orkney diffracted with, and made otherwise. To understand Sand14 as an interference, then, required an understanding of these two mobile telecoms futures.

I sat down at the hardwood farmhouse kitchen table before me, and poured some hot tea from a pot. In my other hand I still held the strange carved stone ball, the curves of its cool granite surface a magnet for my thumb. As I held this enduring prehistoric technology I considered the two groups of evidence that had been reconstructed into Sand14.

Evidence – Future Durability

Two overlapping pieces of paper formed the centre of the first set of evidence: a white sheet with the word '*Capture*' hand-written in large black felt letters; and, beneath it, a highlighted quote from my ethnographic notebook, '*It's the science fiction dream*'.

I had gathered these two fragments during a one-day workshop at a mobile phone manufacturer's design studio near London. I remembered how it had been a dull March day. Six people had flown in to nearby Heathrow airport from corporate sites around Europe, or been given a pass to enter the design studio from elsewhere on the company Research & Development campus. They had one day to create a concept for a new cameraphone device, in response to an abrupt change of corporate strategy. The new cameraphone was to be a mobile phone with a camera built-in, with perhaps some video capability (this was 2004, before such things were commonplace). There had been tension in some of the faces around the room.

The industrial designer leading the workshop, Tony, had stood with felt-pen in hand, ready to record their proposals and ideas on a flip-chart.

"*I create memories [is the intent of the concept]*," he had explained (and I had recorded as ethnographic evidence, heard again as part of Sand14). "*The consumer typology [for the concept includes] the Event Snapper, the Innovator, the Memory Keeper, the Expert…*"[1] He had outlined the consumer types in detail. It was a sophisticated classification model, developed by the company over several years.

Then the representative from mechanical design, his office silo-ed away from me in the opposite building, had leapt up with enthusiasm to do his presentation. "*We brainstormed around the evolution of technologies… 3D displays on phones, expect in a couple of years… [In 2006] you don't see the pixels… it's beyond the human capability…*" Over the next hour he

had gone through his pack of thirty or so slides, each one a different technological feature and possible future. Tony made a list on the flip-chart of the key terms and comments from the group.

Oral storytelling, supported by slides, was the *modus operandi* of the company. The witnessing of decisions was a verbal and visual process, an oral practice and performance of future-making that resonated with Diane Vaughan's account of prediction and fact stabilisation at another site of future technology, NASA (Vaughan 1997, 1999). As decisions moved up and across the company, slides accumulated, and their associated stories became embedded in a growing account of the concept. The future product created at this workshop would accrete slides and stories from that day forward as it passed through different groups of people. The oral stories would shift as the political and strategic work they needed to do shifted, that was part of the skill of the storyteller. The design studio manager, who later reported up to the executive board, told me he had collated a pack of several hundred slides on one project to present to the board in a matter of minutes; a highly skilled practice weaving together visuals from presentations he had never attended into a coherent account of an object.

The mechanical designer had just finished discussing his concept for a cameraphone, which included video conversations, when a marketing manager entered the room. The marketing person had nodded at the slides: "*It's the science fiction dream... All the advertising that Hutchinson did... still can't get people to do this... and there must be something... I am an optimist... It doesn't seem possible that you never want to do that.*"

This was a moment that haunted me. He was no longer just speaking of recording and sending video but of talking face-to-face through the screen. He was speaking of a 'videophone' concept. The videophone had permeated so much of my evidence and experiences in the industry. It seemed to circulate as a 'science fiction dream' – made popular through the Bell Labs prototype featured in Stanley Kubrick's 1968 film "2001: A Space Odyssey", when a character enters a videophone booth and makes a video call home to Earth. But it was also glimpsed in Fritz Lang's silent "Metropolis" (1927), and reproduced as future *de facto* in science fiction cult classics such as Ridley Scott's "Blade Runner" (1982) and James Cameron's "Aliens" (1986). This science fiction dream was when video communications would replace voice communication, an evolution in (assumed) ever-increasing bandwidth, '*from voice to video communication*' as one industry advert put it. The dream was not one of video conferencing, it was not a Skype dream when callers would schedule a video call. It was an evolutionary dream when all spontaneous contact and calls would be video-based, when pictures would replace talk, and voice telecommunication would be devolved into a near-forgotten legacy.

It was a persistent dream in the industry. The first videophone was demonstrated at the Chicago World Fair in 1933. It was launched by Bell as a commercial fixed-line trial in1969, with analysts predicting a billion dollar business in twenty years (Noll 1992). Yet it had faded away. Mitsubishi launched a similar service in 1987, British Telecom in the 1990s, AT&T tried in 1992, and there are no doubt others. Each time the videophone failed to sell in numbers. The Hutchinson mobile videophone, mentioned by the marketing manager, a mobile phone with built-in cameras similar to more recent smartphones, was launched in the UK in 2001 and vanished with little trace (Gray 2000). But despite this repetition of market failure the industry continued to reproduce the videophone as a well-stabilised future. Those at the workshop seemed to have no memory of the last forty years of the videophone within the industry. Instead of citing this well-worn past they reproduced the videophone as an imagined future, the same old version of video communications replacing voice.

The moment had passed. The mechanical designer sat down, his slides now part of the new concept for the company. The next presentation had been from a quiet woman sitting next to me, a representative of the elusive Social Research team. She began to present her account of the 'social future' of the new cameraphone: "*[The] basic psychological needs for achieving a quality of life [are]... Storytelling, Sharing, Re-experiencing*," she said. She spent some time explaining the importance of these three 'user needs' – derived from the management textbook approach to Maslow's Hierarchy of Needs (Maslow 1943; Cullen and Gotell 2002) – and she discussed the supporting social research conducted at various locations around the world.

After lunch we reached the moment when the group had to transform these diverse oral presentations from engineering, marketing, and social research into a bounded, particular future concept for a cameraphone.

Tony pointed to his notes on the flip-chart, collected from the discussions. "*We're... trying to design a concept that does a number of things... Can we cluster the important ones [into key features]?*" He asked everyone.

He then transferred all the key words and phrases collected during the meeting on the flip-chart onto individual pieces of paper. He scattered the thirty or more pieces of paper over the paint-flecked floor. Everyone had crouched and huddled around the words, moved and grouped them on the floor, studied the associations and relationships trying to fit them together into meaningful groups. Over the next half an hour or so they collated the sheets of paper into three messy groups; three qualities that would highlight the key features of this new cameraphone device. Tony then went around each of the three piles of paper and,

in discussion with everyone, gave the group of features a name, a category. These three categories were to define the future of their new cameraphone product.

"*The three super-categories [drawn from the scenarios] are Capture, Consume and Manipulate,*" announced Tony. He had written each category on a new piece of paper and placed it on top of the appropriate collection.

Three words. Three words that defined a future.

"*This is not coming out of thin air. This comes out of two years [research],*" Tony had said. There had been quiet, perhaps embarrassed, laughter. All the subtle inflection during the discussion, all the care and specificity of the social research, all the caveats and concerns of the mechanical engineer, all erased by three words, soon to be transferred to a PowerPoint slide and re-told in a short oral story to senior management. Two years of research into three words? By some strange quirk they had begun the workshop by outlining the intent of the future device as a memory-maker ('I create memories') but their discussions had then erased forty years of videophone history, and flattened two years of nuanced, interdisciplinary research into three words. Yet the marketing manager had been upbeat and declared the outcome of the workshop '*aspirational*'.

The lack of enduring memory in the mobile telecoms industry, of documented history, should not have surprised me; in my industry experience the past was not considered important. Corporate memory has long been held as problematic in technology industries; history-making bound up with corporate and techno-cultural ownership struggles (e.g. Schiffer 1991). In this design studio near London the new cameraphone concept, which captured memories and enacted an earlier science fiction dream of the videophone, was made by simultaneous erasure and reproduction of an old future. The old videophone future was made new again. Even the memory of the previous mobile videophone from Hutchinson was discarded. The videophone was an asymptotic future, always made again at the limit of the possible and never reached. I had just witnessed the practice through which such erasure and replication took place. The detailed and subtle research conducted by the different teams was flattened (literally) into three piles and three words ('Capture, Consume and Manipulate'), flattened and almost erased to create a 'new' cameraphone concept. The oral story that would be passed on in these three words would contain very little of what I had heard that day. It seemed that the workshop was not intended to imagine something 'new' as I had anticipated, but to demarcate a future concept as a boundary object (Leigh Star and Griesemer 1989). This shared object that the inter-departmental meeting had made and witnessed could now move around the company between different politics and epistemes,

from mechanical to design to marketing to senior management. It was making the boundary of the concept that mattered, creating its coherence and stability through inter-departmental agreement, not the specific future it contained.

As an ethnographer who had also worked as a designer inside the industry in a prior career, I had a love for its cyborg sociotechnics. And I felt it was a lack of love for the cameraphone concept that was the issue. I was inspired by Bruno Latour's sociotechnical love interest. In his detective work tracking down the crime of passion that was the end of the Aramis personal rapid transit system, he argued that it was because the developers did not love Aramis that she 'died' and never became a commercial reality (Latour 1996). Over 17 years the developers of the train system never changed the concept, never made the difficult compromises to make the technology work, instead they idolised and adored the concept as pure, un-negotiated possibility. The same idolatrous love was true at the mobile telecoms industry workshop: there was an adoration of a particular future, the videophone. In the design meeting I had witnessed the process by which an extraordinary amount of (very expensive) research was flattened into a bounded shape entitled '*Capture*' '*Consume*' and '*Manipulate*'. These three words had been chosen to encapsulate a future mobile phone. It was into this agreed boundary that a new cameraphone would be poured. This was the shape that would hold during the coming design and development. But this boundary for a 'new' device was also in part constituted by an 'old' dream – the videophone. In following their science fiction dream they replicated an old future that had already failed, and kept the dream alive. As part of the cameraphone concept, the videophone dream was re-made as a future.

So here I identified the first major characteristic of future-making in the mobile telecoms industry: its lack of enduring memory.

To experiment with doing things differently I needed to avoid the repetition of worn-out futures, such as the videophone. In my method of future archaeology I needed to be located somewhere both where the past was remembered and technological histories endured, and where there was an abiding commitment to the future. To do my experiment I needed a place imbued with an unforgettable technological *longue durée*, where undead futures such as the videophone could not be resurrected.

I looked down at the strange carved stone ball, its smoothed surface now warm as I turned and turned it in my hand, and then looked around my reconstruction, smiling.

Sand14 as a diffracted design studio was made, in part, from a five thousand year old Neolithic monument. It was made within one of the most extraordinary Neolithic landscapes in the world: within half a mile were several towering stone circles, chambered tombs, standing stones, a vast citadel of stone buildings still under excavation, and all around the archipelago were monuments and museums filled with prehistoric technology. There was no forgetting the past here. Time had depth. A local Orkney playwright had explained that out of his window was a Bronze Age village, across the road a Viking settlement, on the shoreline remnants of Iron Age buildings, and behind him a standing stone. "So it informs the decisions you make," he had said. "It's like being part of a long set of beads, that stretches thousands of years in to the past, and you're just a dot, a part of it. And it influences how you think about the future." Orkney was a place that thought a great deal about the future. Beyond the line of hills to the west lay the wave energy test site for the European Marine Energy Centre, a world-renowned seascape where local people were participating in the formation of a new renewable energy industry. Orkney, although steeped in time, was not a place mired in the past, it was a place moored in the future.

Its 'future durability' was why I had diffracted my evidence through Orkney. Its technologically ancient landscape resisted the forgetting and the foreshortening of temporality that happened in the mobile telecoms industry near London. In this landscape old futures would not be forgotten. Past and future technology endured in the islands, were imagined and made to endure. In the words of a well-known local poet, 'the Orkney imagination is haunted by time' (Mackay Brown 1969).

Evidence – Future Locality

Unable to resist I pressed the nodules of the carved stone ball with my index fingers, as though typing or playing with the keys on a mobile phone, and looked at the second set of evidence swarming over the walls that constituted Sand14. This was the second characteristic of future-making in the industry that my method of future archaeology diffracted.

There were copies of two press releases that were central to this characteristic, neither concerned with the handset, but rather the imagining and making of the network infrastructure.

Orange UMTS launch reinforces 3G confidence at World Congress. In the convention hall, in the private Nortel Networks demo centre across the Boulevard de la Croisette in the Majestic Hotel, and around the streets of this picturesque city, users are recognizing that '3G is for Real' in 2004.[2] — Nortel Networks press release, 23 February 2004

The Mobile World Congress (previously known as the 3GSM World Congress) is one of the industry's most important annual events. Now in Barcelona, it was for many years held in Cannes, France. I had attended the conference in 1997 and 1998 during my time working in the industry, and had experienced the 'floating gin palaces' (as a journalist interviewee had put it) of the corporate yachts, the exuberant lasers and firework displays over the sea, and the intensive deal-making and demo-ing by over 30,000 senior industry figures, many paying over $4000 for a conference pass. The press release was from several years later in 2004, during my ethnography, when I interviewed several attendees. This was a time soon after the auction of 3G radio spectrum licenses in Europe, which had created vast corporate debts ($600 billion in one estimate; Cheng, Tayu et al. 2003), an industry crash that had led to over a million people being made redundant (an estimate made by the journalist), and which some industry analysts regarded as nothing less than an industry 'apocalypse'.[3] It was a time when the 3G network technology that would utilise the spectrum and generate revenue to repay those vast debts was still in development. Suffice, there was much invested (literally) in the future of 3G, and much invested in stabilising this sociotechnical future and making it 'real'.

So how was 3G made 'for real' as the press release suggested? What practices were involved? The second press release, pinned up on the Sand14 wall, was instructive.

Nortel Networks, Orange Deploy UMTS in Cannes. Nortel Networks and Orange have completed a five month UMTS network deployment to provide live third generation (3G) coverage for Cannes and portions of Nice - including the airport - for 3GSM World Congress 2004. — Nortel Networks press release, 23 February 2004

The scale of the 3G network installation was staggering. The whole town of Cannes and portions of Nice had been modified. This was an entirely new mobile network infrastructure deployment, requiring a physical re-working of the landscape. Buildings throughout Cannes and Nice would have been co-opted for the equipment, new cellsites and antennas erected on roofs and walls. All this had taken five months to deploy. Five months of delicate engineering for three days of conference; and this was no well-rehearsed, well-packaged technology, but an unstable trial network. Ultimately, when the mobile telecoms industry

arrived and switched on their phones at Nice airport, the mobile network would simply work. [4]

But, then, those in the industry would expect nothing less. In the places where the industry was located, such as near London Heathrow airport where the majority of the UK industry was based, mobile signal coverage was pervasive. The wireless and wired landscape inhabited by the industry was thick with high-speed data services; it was one of the first locations for two-and-half-generation GPRS mobile data networks to be deployed. The everyday experience for those designing the future was one where the mobile network was 'Always On' as the popular industry saying put it. Thus 'Always On' was part of the natural-cultural landscape of the mobile telecoms industry.

But there is a geo-politics to such mobile network coverage: other parts of the UK, particularly large parts of rural Scotland, remain without mobile data access. There are chronic 'not spots' without wired or wireless broadband data due to the distances of copper cable involved or the mountainous landscape, and there are no plans to deploy 3G networks in such locations (Consumer Communications Panel 2011).

Network infrastructures are always socio-political as well as technological, as has been long argued (Star 1999). The labours of installation and maintenance, the economics of their roll-out and operation, their participation in national politics of 'access' are integral to such network infrastructures as objects (Langtry 1998; Crow, Longford et al. 2009).

But this particular infrastructure in 2004, this trial network in Cannes, was enacting a particular sociomaterial future, one in which 3G was a reality, as were the billions in revenue that might derive from such a network. The wireless landscape of 3G was 'for real' during the conference, and in Cannes and parts of Nice, but only during the conference, and only in that location. The future might be 'for real' but it was transient in time and place. This temporal and spatial partiality was in stark contrast to the extensive promotion of the network during the conference. My ethnographic evidence included a sea-bright photograph of a cafe on a pontoon that year, with a vast banner hanging in the sun: 'Orange Everywhere'. The Orange CEO at the time was explicit: '*Our theme at Cannes this year is Orange Everywhere which is about giving our customers what they need, whenever and wherever they need it*'. But this 'whenever and wherever' wireless landscape constituted a place that did not exist most of the year; the conference attendees were not in everyday Cannes but in a 3G-augmented Cannes, and it was this natural-cultural landscape made to be 'always on' that reproduced a very particular industry future: *ubiquitous access*.

The dream of 'ubiquitous access' was most often expressed in the oft-repeated industry slogan: 'Anyone Anywhere Anytime'. There has been extensive comment and critique of this utopian future of perfect telecommunications: its production of an idealised perpetual contact (Katz and Aakhus 2002); its Judeo-Christian heritage in the Tower of Babel (De Vries 2005), its historical reproduction through time from nineteenth century telegraph futures (Mattelart 1999), through to the popular versions of Marshall McLuhan's 'global village' and Bill Gates' 'friction-free capitalism'. The utopian dream of perfect connectivity through time and space also resonates with the future articulated in ubiquitous computing (Dourish and Bell 2007), another example of a situated future reproduced over several decades.

The trial 3G network was yet another performance of this utopian future. Its transformation of Cannes was a set of sociomaterial practices that altered the landscape and enacted the industry asymptotic dream as an experience. In this fleeting place a partial infrastructure, particular to its place and time, was experienced as a pervasive network that was 'whenever and wherever'. Such a transformation of the patchy and partial prototype into a universal 'real' network was possible, in part, because of its continuance with the wireless and wired landscape the industry inhabited. The industry dwelled in particular locations where wireless data networks were experienced as everywhere; it moved in a distributed landscape of an *Always On* infrastructure, and the 3G trial network was an example of the extraordinary work necessary to maintain this tenuous place. However, the ubiquitous network was not everywhere, and would never be everywhere: locations that were deemed not important or not of value, such as 'not spots' in rural and remote locations, were not included in this 'whenever and wherever'. Such places required national policy and regulatory interventions that operators were forced to adopt (e.g. Ofcom 2006). Ubiquity was not universal but partial, with a socio-economics that made particular rural landscapes, often synonymous with low-income areas, invisible.

This was the second characteristic of future-making in mobile telecoms that I identified: its lack of sensitivity to future locality.

To do a different mobile telecoms future, then, required a diffraction of the potent future that was ubiquity. Rather than a future that reproduced (always-partial) ubiquitous access, the future made by Sand14 needed to retain the sociotechnical specificity of infrastructure. My method of future archaeology needed a place where the local had effects, a place where ubiquity would be resisted. Orkney was a remote archipelago of predominantly farming communities with a low-density population: around 20,000 people were scattered over twenty or so green and heather islands. This was a place where all infrastructures were visible and an everyday concern, as is often the case for island locations in the world (Baldacchino 2007). It was expensive and problematic to move electricity and data around.

Cables had to be laid undersea, through important wildlife habitats, or archaeological sites. In the fierce, near Arctic storms the lights, and often the phones and internet, went out. Moving bits and bytes of data was a visible and difficult endeavour, with many of the islands on microwave links for their so-called fixed line telephony; sometimes island telecommunications were cut off for days after a power-cut. Yet even though this was the UK, a bare few hundred miles from the telecoms industry near London, it was impossible to imagine universal, friction-less grids of electricity or data here. Network infrastructure snagged on the hills and seas that resisted radio wave and cable propagation, and snagged on the distributed population where the cost-benefit ratio of antenna, copper and fibre rollout did not add up. Orkney was a landscape that resisted ubiquity in the sociomateriality of its very islands.

'Future Locality' and 'Future Durability' were the two characteristics that the Orkney Islands, and in particular the 'Heart of Neolithic Orkney' World Heritage Site, possessed as a place. Its natural-cultural landscape had an agency that both haunted time and enabled futures to endure, but also resisted ubiquitous futures and made the partiality of network infrastructure visible. This was why Sand14 was here. This was why I was here.

But the most important question remained. What did Sand14 look like as a diffraction of mobile telecoms futures? What other future did it enact? What was the result of my experiment? This, then, is one result. One small effect. And I held it in my hand: the prehistoric carved stone ball.

The Experiment – Sand14

In my reconstruction, through my diffracted evidence, I heard voices from outside the kitchen and headed away from the warm peat fire towards them. In the large studio space beyond, sunlight was shattering the rain-grey cloud and reflecting in sharp edges on the floor. Through the vast semi-circular window, oil-dark seals curved like moons, watched me from the beach.

Three people were talking together around a flatscreen, sipping mugs of steaming tea; three designers who worked at Sand14, an effect of my diffraction as much as the building. Their words were drawn from the practices and conversations of the designers and engineers I had engaged with during my ethnography. They were discussing their ideas for a new

mobile device concept, for this was how my experiment was to be performed. Their remit was given by my fieldsite near London. My experiment was conducted by the way Sand14 might take a design remit, as fragments of ethnographic evidence, and reconstruct a different mobile telecoms future.

"*I create memories [is the intent of the concept],*" explained Simon, a mechanical designer with spiked white hair. His statement was that familiar fragment of evidence from the workshop near London. As it was the conceptual intent for the designers in London, so it was the conceptual intent here at Sand14. But in this experiment the outcome would be different.

Anne, the social researcher, agreed, "*memories need simplicity, clarity. Just the right memory… [We need to] help people re-experience their memory… other people's memories.*" She pushed damp grey hair from her forehead, cleared her glasses.

"*How do you stitch together an entire experience?*" asked Simon, thinking aloud. "*That's the thing.*" He was sketching in a notebook, speaking without looking up. "*How does a device help you to recover experience? …How to create an experience for your senses?*"

"*It's the art of enchantment, making something magical,*" suggested Soo-Yin, staring out through the window. The industrial designer stood pin straight, arms crossed.

They were quiet for a while, watching the seals slide away into the loch. Anne drained the last of her tea. "*[How do people] access something you hand on from generation to generation,*" she said. "*Digging slides up, box of prints from the attic… That's an experience we should understand… That nostalgic experience.*"

Soo-Yin nodded at the view through the window, out across the loch to the distant stone circle on the dark horizon. She reminded the group of the excavations that were happening all around the islands, the experience of digging up artefacts from an archaeological trench; the sense of connection with the past that happened in those moments, the visceral sensory experience of almost touching people in the past (Holtorf 2005).

She noted that if they were going to take 'create memory' as an intent for the future device seriously then they had to consider for how long the memories should endure; some Orkney

families cited themselves going back hundreds of years. How would an object maintain memory, she asked. If the device was going to endure, be dug up from a decaying box, or found rattling around in a storm-torn, damp out-building, then the infrastructure for repair and maintenance was as integral as the radio network.

Anne nodded and gestured through the window to the wind turbine blades turning slow and pale in the far distance. Local companies had acquired expertise in the maintenance of wind turbines since it was too costly to send south for a repair team. The small island communities, a few hundred people, now had local experts in the maintenance of their electricity network. She suggested that they think in terms of an open architecture, publish a comprehensive manual, and work with the islands to establish repair companies, embed the skills in an ongoing organisation that could both endure and support people around the world. Islanders are often entrepreneurial, she pointed out (Baldacchino 2005). If the islanders could convert a car to an electric vehicle, manufacture biofuel, and operate as commercial energy providers, then they could fix an appropriately designed mobile device with catalogue components and a rubber band. She grinned.

She was drawing on ideas of fluid technology; notions of how a device can be designed to be maintained as one kind of technological object, but mutable in the way that its parts are constituted as it moves from place to place (De Laet and Mol 2000). A fluid technology is integral to, and inseparable from, the different communities and landscapes in which it is located. Its locality, the people and place, maintain and operate the device, re-design it *ad hoc* as it is repaired with locally available materials and social relations. Its parts change yet it still does the same work. Such a device is designed to be always local. It is designed to be appropriated and re-designed. The device that Sand14 proposed would be repaired differently in different places, with different things to hand. By designing the device to be fixed by different communities on different Orkney islands, they were also designing it to be fixed in different ways by other, different people and places.

Such situated sociotechnical infrastructure would help create an enduring mobile device. So this was their diffraction into future locality. But they still needed to imagine the form and shape of their future concept.

Soo-Yin laid out a copy of a National Geographic article on a recent archaeological excavation with a pink post-it attached that read: '*archaeology discovered*'.[5] She raised an amused eyebrow at Simon, who smiled in return and nodded towards my hand, clenched around the prehistoric carved stone ball found here in the World Heritage Site.

Following Simon's gaze I held up the granite-like carved stone. It had six circular ends extruding from its surface, as though pushing towards a surrounding invisible cube. What to do with such a shape, I wondered, rolling it from hand to hand, feeling the surface around the six nodules. The object resisted identification, seemed relentlessly alien, and I sought to find something familiar for comparison. I glanced at Simon's binoculars by the window and, inspired, held the stone model up to my eye, looked down one rounded end as though it were an eyepiece, a telescope into another universe within the stone, a microscope into the granite. There's a whole universe in here, I said, pretending to peer into the shape. Simon and Soo-Yin blinked, exchanged a glance with each other.

In the ensuing silence Anne suggested taking a walk to the passage grave just down the road, a prehistoric monument that was part of the World Heritage Site. Simon grabbed his rucksack stuffed full of camera gear, and we headed out into the rain.

It was a twenty minute walk through wind-whipped air to the four thousand year-old grass covered mound rising up out of a field. We stood for a moment before the dim entrance into the earth. The stone passage was a dark rectangle, only a few feet high, its stone sides slick with damp. We bent double and shuffled along, feeling wet rock against our hands, our heads and backs, hearing our footsteps and breathing, called on by a yellow lamp at the far end. And then we were out, able to stand up in a cold stone room at the heart of the mound.

In the darkness we could see the light of the world reaching down the long narrow shaft in a white-gold beam. At the mid-winter sunset, low sunlight from above the hills would flood this tunnel with momentary light. But for now I felt cut-off from that world, elsewhere.

Simon switched on the electric strip-lights, and we looked up into the corbelled roof, at the four standing stones marking the corners, at the precise architecture of its layers of stone, placed without crack or cement. The walls were smooth, damp-cool beneath my fingertips. In the centre of the three sides were square holes, entrances to small alcoves within which were once burials. Soo-Yin had her notebook out, caught up in the experience. She reminded Simon of the questions from earlier: how could they capture the memory of being in this extraordinary place, how to make such a memory endure.

Simon paced and then began to take video footage. He placed the camera on the edge of each alcove, and then in the doorway, capturing us from all four directions. He left the

camera running for a time as we looked around, felt the enlivened acoustics, the echo of our voices and movement. As Simon worked his camera we turned and turned again beneath the stone roof, over the gravel floor. We listened to the still air, watched a sparrow glide in through the passage way and alight on a corbelled edge, brown chin to orange stone. We were silent. We were silenced. The monument had a palpable effect, an agency that turned us inward, imagining.

We returned to the kitchen at Sand14 and shared a large communal pot of tea to wash away the chill. We were all subdued, thoughtful. The designers shared a few quiet words and promised me a demonstration of a future mobile device the monument had inspired.

Soo-Yin now placed four video cameras and a heap of cables on the table. Simon gestured for me to place the pink granite carved stone ball on to the table. I balanced it on one end so that the four circular nodules around its circumference seemed like telescope 'eyepieces' into which I might peer, as though into a granite-silica universe. They placed the four cameras around the sides of the carved stone ball to create a cross at the centre of the kitchen table. The cameras each looked in to a nodule on the carved stone ball, their lenses along the line of sight as though they were an extension of the ball's own rounded protrusions. The cameras almost extruded out of the four sides of the stone ball, so that it appeared as a nexus upon which they were focused. In this arrangement the carved stone ball was transformed into a mobile telecoms future.

My breath caught as Simon and Soo-Yin, hand on each camera, pressed four 'play' buttons in sync. Then they bent to each viewfinder in turn, watching the queued-up video play. They backed away and invited me to see.

Through each of the four cameras I saw a view of the inside of the passage grave, from each of the four directions – the three alcoves and the passage. The views looked in to the centre of the passage grave and showed us standing, turning, listening with quiet awe. I could see myself recorded through four directions. It was as if the stone chamber had been shrunk into the carved stone ball, and I was looking through its four sides into a memory; its round ends had become eyepieces into, not another universe, but a memory, a memory of a place, a memory of moments from my past. The ball contained a world caught in the permanence of stone. Placing my hand on the stone model I could imagine this enchanting, magical object being left alongside postcards and newspapers in some attic, lost beneath the floorboards, or buried in a midden. This was Sand14's generative diffraction into a mobile telecoms future that would create memories.

How would it work over time, I asked them, rocking the stone back and forth; it seemed to want to be touched. Simon covered my hand and smiled. It was kinetic, powered by movement, he explained, so that when it was found a generation or so later it would only need rocking or shaking to re-activate. Just as you did, he said. It meant that the videos could be kept for as long as the device endured. It needed no separate power transformer block or power cable, which would no doubt be lost in the ensuing decades. You pick it up and the images just come to life in your hands, the designer said. And then when you touch it against another device, he grabbed another carved stone ball and held them together, then a peer-to-peer network is established to transfer all the video data, or you can touch it to your computer and it will send the videos there, or send them over whatever mobile network is in the air. It's about using whatever infrastructure you have, he explained, including person-to-person. Gifts and reciprocity are sociotechnical infrastructures, too. We're network-agnostic, to be practical here in Orkney, he added with a smile.

I held the stone in my hand once more, and imagined finding it years from now. Perhaps it would be handed down, repaired and tinkered with in different ways by different parts of the island, gifted to me, and then some movement, a tilt, a shake, an accidental tumble would bring it to life and replay its memory a generation, two generations, later. And we would be there, the monument would be there, in the stone that had become unique to this place. In there we would be a memory, a story to be told, so that stone and story might be remembered and passed on.

This was not reproducing another videophone future, or some ubiquitous 'always on' device. This was something else– an enduring, located camerastone; a different future with different politics for the mobile telecoms industry.

And so perhaps it matters that after the making of this interference pattern, after one of the first performances of Sand14 to an industry audience in 2005, one mobile telecoms marketing manager was heard to say: "We should do something like that."

Conclusions

In material-semiotics 'storytelling is in no way an "arts practice"— it is, rather, a fraught practice for narrating complexity' (Haraway 1994, 63). Sand14 is a story and empirical experiment in 'future archaeology' that is committed to the materials and evidence of my ethnography. The camerastone is one outcome of that experiment, an interference pattern

constituted by combining my evidence with the natural-cultural landscape of the Orkney Islands. It is one speculative answer to the industry remit for a new mobile device.

The camerastone is not intended to be a well-bounded prototype, or a vision ready for adoption by the mobile telecoms industry. Instead it is intended as an intervention, a snagging technology that catches at what often slides passed in industry future-making, edges burnished from long use. It is intended to make visible the *durability* and *locality* of futures in mobile telecoms (see also Watts 2005, 2008). The camerastone, as a form of memory sharing device, does not reproduce old futures such as the videophone, but draws on the enduring landscape to imagine an equally enduring future, with a self-contained power system to support its use over generations. Its conception does not assume ubiquitous mobile access but supports *ad hoc* networks, including social exchange networks; and it includes the sociotechnical infrastructure for its ongoing always local, fluid repair and hence re-design. Rather than a ubiquitous dream of instantaneous data exchange, with distance annihilated, the camerastone is a dream of transmitting memories over time, from hand to hand, from generation to generation; the temporality is deep, and the landscapes rich.

The Sand14 experiment suggests that there are always possibilities for the future to be otherwise, possibilities that remain committed to the specific and extraordinary sociomaterial, socioeconomic, and seductive world that is the mobile telecoms industry. For although much is foreclosed, the future is never finished.

Epilogue

The walls of my reconstruction were gone. The experiment that was Sand14 had ended. The grass-covered dome of imagined possibility had dissolved into the mist, leaving only the foundations of a prehistoric village again. On the far side of the loch the lights of a house had come on.

I stood before the stone box of red gravel that had once inspired the glowing peat fire of the kitchen, and poured the orange stones through my fingers. As I leaned over, the carved stone ball that had inspired the camerastone fell into the hearth. It rested there for a moment, rocking.

I knelt on the edge of the prehistoric hearth, and burrowed down through the gravel with my hands. I pulled out a few handfuls of clean earth, and pushed the granite model down into the ground, then covered it with earth and gravel again.

It's there now, another archaeology, another fragment, for another time and another story.

This one is done with. I would be back for another story one day, but I would be back. For the future at Sand14 is always and *for always* a possibility.

Acknowledgements

Biographical Note

Laura Watts is Assistant Professor at IT University of Copenhagen, and an ethnographer and writer. Her research explores the effect of landscape on how the future is imagined and made in high-tech industries, from telecoms to renewable energy. She is the co-editor of 'Orkney Futures: a Handbook' a collection of imagined island futures by poets, academics, and islanders. See http://www.sand14.com

Notes

[1] All quotations are taken from ethnographic notes of the cameraphone workshop held at a major mobile phone manufacturer design studio in March 2004.

[2] UMTS, Universal Mobile Telecommunications Service, is one particular version of 3rd Generation mobile telephony (or '3G'), which is based on the technological standard of GSM. There are other versions of 3G that derive from different technological standards, such as CDMA.

[3] Quote from The Informer (2002) A Week in Wireless 66, 23 August 2002, published on telecoms.com

[4] Although the first 3G mobile phone (Nokia 6630) was not launched until after this event in November 2004, trial handsets were in use at the conference.

[5] This National Geographic image and attached post-it note were part of my ethnographic archive, collected from a mood board used for inspiring a new cameraphone concept in the mobile phone design studio.

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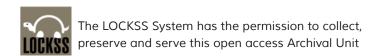
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