Some thoughts on Neoliberalism and Histories of Technology

Keith Breckenridge

The idea of neoliberalism, as a confusing mix of ideology and epoch, has an almost banal place in contemporary social-science of and from the global South. It has become ubiquitous, and talismanic, signalling good left intentions, and, often, doing far too much explanation. It is typically deployed as a black-box to account for everything – injustice, inequality, capitalism. (Search for Neoliberalism and Marikana if you want to see how this works.)

I suspect that this preoccupation with neoliberalism may be especially powerful here in South Africa where the concept has been influentially used by Patrick Bond, Jean and John Comaroff and their students, and by Jim Ferguson. Certainly I think that I can make the case that Bond's explanation of the political outcomes of the negotiated settlement that ended Apartheid prefigured (and probably triggered) David Harvey's very influential synthetic overview. Which is all a way of saying that the term may be dangerously overloaded. Yet I also think there is also something undeniably technological (and infrastructural) about it.

Neoliberalism is used to explain very different moments and processes in our recent history: on the one hand the National Party's embrace, in the early 1980s, of the market and of the morality of success, against cross-class racial solidarity. Under the influence of Thatcherism the Apartheid state abandoned its role as the demiurge of the economy, a shift that led rapidly to the demise of agricultural cooperatives across the country and their ubiquitous grain-elevators at the end of (completely uneconomical) branch railway lines. This turn away from the subsidy as instrument of racial solidarity and levelling also led quickly to the decay of infrastructures in schooling, health-care and recreation, many of which were rapidly abandoned, or privatised. This was a Thatcherism that embraced the market (and bureaucratic rationalisation) in theory but in practice spent lavishly on military equipment and policing, and ran up massive amounts of debt.

The term is also applied to the policies of the African National Congress a generation later, especially the turn away from deficit spending, and the very radical reduction in the capacity and ambitions of state intervention. Much of this was actually neoliberalism by accident with the determination to reduce spending – informed by the experience of the debt crisis (especially in Zambia) in the 1970s – producing very serious decay in health-care, education, social welfare, roads, and state-supported facilities everywhere. To say that this was deliberate, as some do, is essentially to ignore the entire ideological project of the African National Congress, and its allies. For most of the last decade the ANC has been frantically attempting to reawaken the bureaucratic demiurge; in doing this the government seems to be working against a global technological current.

There are some problems, then, with the term, but the world that is characterised as neoliberal, emerging from Deng Xiaoping, Margaret Thatcher and Ronald Reagan, does seem technologically distinctive. The state, as Agar's machine, has been significantly weakened and hollowed out, with many of the strategic knowledge-making functions outsourced to consulting firms. There has been a visible and tangible shift in investments and construction away from expensive state-funded and subsidized infrastructures (railways, parastatals, health systems) to privatized and user-fee driven systems (toll-roads, prepaid cellular networks and municipal services for water and electricity). Wireless cellular systems – with new networks and financial arrangements – have replaced and completely eclipsed older brick-and-mortar networks in postal, telephone and banking. Across the African continent this has had quite revolutionary effects on the nature of money itself, the provision of credit, and the collection of biographical information about individuals. Large, privately owned and managed, computer systems for tracking credit

histories have been adopted very widely, often linked to biometric authentication tools. These new credit management systems are often linked to individualised cash-grants, for pensions, child-support or humanitarian support. Computers, in other words, have become very powerful agents of a new kind of individualised, and data-driven, financialisation of the real economy. This means that the state, finance capital, and the engineers designing the software systems that both sets of institutions use have abandoned the older ordering categories – Caste and Race – that were essential to their operations before the development of large scale biographical databases. Key here has been a turn, away from production, towards profits derived from debt and the identification of credit-worthy individuals.

Worklessness is perhaps the most powerful characteristic of neoliberalism. And, while this has much to do with a shift in investments away from production towards financialisation, it has also clearly been fostered by the forms of automation and communication sustained by the Internet. Neoliberal worklessness has a flip-side in informality, which is also heavily shaped by the opportunities and limits of wirelessness, social networking and credit worthiness. Perhaps the most compelling political question, on the African continent, is whether the efforts of banks and the (much weakened) states to capture these informal activities -- by tracking individuals and their money -- will succeed.

If some of this is true -- ideally beyond the African continent -- then I think we can begin to think about ways of researching the history, and especially the technological histories, of neoliberalism.

Capitalism and neoliberalism: does it concern technology really?

I am not a specialist on economic theory. Neither am I very versed in political language and positioning. I read the paper (like most people I was about to add, but instead I will qualify that with: like some still do here in Europe), I follow the discussions, I vote. In doing that, however, I have noted an increased attention to how the story of Sweden is being told and retold. And in that story, technology features, but so far only on the margin.

Sweden has had a social democratic government for most of the 20th century. When it was replaced by a coalition of farmer, liberal and conservative parties in 1976 it had been in power for more than 40 years. Since then similar coalitions have been back in power once (1991-1994) and is now again since 2006. Probably my reading of this is somewhat different than the readings my older colleagues might do, those born in the 1940s and the 1950. And likewise my younger friends, born in the 1970s and 1980s even, would perhaps see this in a different light. I grew up and got my world view of Sweden when the welfare state was probably at its peak, remembering 1976. But despite how we have perceived our country changing, I think most would agree, that narration has become key to political debate and that the power over that story of what Sweden was, is and can be is central in making promises for the future in which technological change and maintenance fit.

A nation can have many imagined identities. I think few would oppose when I say that neutrality, the welfare state and engineering ideals are prominent in the self-characterizing of Sweden during the 20th century. Iron and steel, paper and pulp were early sectors already around, but a century ago telecom, transport (automobile and flight) and power (including electricity transfer) grew as areas in which a new academically trained engineering corps could develop ideas and system, sometimes resulting from single ingenious inventions. The welfare state as such was a 1930s idea gaining material traction in post-war Sweden, which, partly due to its neutrality during the war, was very strong economically in the 1950s and 1960s. The ways in which welfare state ideology was coupled with engineering ideas and rationality have been discussed by Hirdman (social engineering) and Tydén (sterilization) and others. Less attention has been given to the industrial sector.

Scholars like Kaijser, Fridlund and others have pointed to the successfulness of the bond between the strong state – in the shape of authorities – and private enterprise in forming long-term procurement contracts that allowed for stable conditions for technology development. Adding to this, the policy of neutrality allocated money to the military sector to which there was also a civil side, as argued by Lundin et al. Changes in this setup started already in the 1970s but gained momentum in the 1980s. Now there is only one monopoly left in Sweden and that is the one on alcohol. Everything else is liberalized and the pendulum has swung to its farthest end. However, one of the most striking things with the political process around the liberalization in not its totality, but that from a distance it seems a-political; it did not matter who was in power as if liberalization was a super-ideology.

Liberalization coupled with global venture capital give radically different possibilities for technological development. Waluszewski has noted how state efforts to support national endeavor are extremely uncertain since the temptation to sell off success is not only great but also sometimes forced as a consequence of global investment. Over a longer time perspective, the conditions for technology development seem to have undergone fundamental change.

And here is where narrative comes in, because liberalization has not been without critics, on the contrary. Even those who were responsible are now having second thoughts. Things don't work as planned and there are unexpected externalities one might say. That no one talks about deregulation (since we never seem to have had more regulation than now trying to achieve at least some things in the unruly market) is just on the margin actually.

In the wake of stopping trains and decreasing telecom reception stories on how it used to be are formed. Just like the sun always shone during my childhood summers so we collectively remember the past when the present seems to deteriorate. But in a political process we should have a better basis for discussing technology and society than our memory. Historians of technology actually know some of this and should engage with issues on growth and history that can inform the process of trying to understand the 20th century.

However, we should also ask if this history writing is not at the same time in the hands of particular interests that favor a certain kind of society as well as a certain kind of history. Is it not the cousin of the idea of progress and precisely that which contributed to the great acceleration to use Will Steffen's term? I think so. A great challenge for historians of technology is to admit that we have been part of the progress narrative when for example uncovering the importance of state procurement for growth and welfare. But even greater is the challenge to redirect that analytical skill and theoretical thinking towards both the present global challenges and their relation to technological change over time. If you ask me, I think we have a good deal of work ahead.

Nina Wormbs, Stockholm, Sweden

On Energy, War, and Global Capitalism
Toby C. Jones

War, energy, and capitalism have deeply entangled histories. Oil and the struggle for its control have proven a particularly volatile engine of global conflict. While this has long been true, in the late 20th century the relationship between energy and war was transformed. This occurred most notably through the creation of a technopolitical order in which the distinction between war and energy was erased. The epicenter of this system was in the Persian Gulf, home to the largest reserves of oil and natural gas in the world, and, home to almost continuous war since 1979. The effects of geographic and technological changes made in the Middle East have had global consequences. It is hardly only a regional story.

New relations between energy and war were made primarily through the militarization of the physical networks in and through which oil flows. The results have been considerable, most importantly by making energy crises and energy wars permanent structural features of the global political economy. Below I introduce an argument for a new approach to energy and war, and, for the moment (the late 1980s) when I believe this system begins to take shape historically.

A broad range of scholars are accustomed to thinking critically about global capitalism, its structural features, and its many effects. Since the late 1970s this discussion has been framed in large measure through the lens of neoliberalism. Massive political economic shifts followed from the redistribution of labor globally, through the institutionalization of austerity, the acceleration and deepening of gaps between the wealthy and the rest, and, the prying open of markets and reconfiguration of political authority around capital flows in the global south. Making sense of global liberalization, largely driven by the politics of the Washington consensus and the Western pursuit of resources, labor, and markets abroad, has come to occupy a great deal of analytical attention. And for good reason.

And yet, as my panel colleagues make clear, the critical embrace of neoliberalism comes at some cost, closing off other analytical possibilities. Energy's flow, the wealth the sale of petroleum generates, the ways in which petro-power shapes relations between a broad range of actors globally, does not fit the conceptual frameworks that are often deployed to make sense of neoliberalism. Large oil producers like Saudi Arabia wield fantastic wealth and often use their financial resources to shape relations and economic ties outside the institutions central to the neoliberal order and with significantly different political economic objectives.

More importantly here, energy's relationship to the global political economy, especially in the ways that it has become integrated in a system of violence, operates in parallel, if not entirely outside, the neoliberal order. That is, the technopolitical system that links energy and war, while it intersects with neoliberalism in various ways, also exists to some extent outside of it, a global order unto itself.

With this in mind, we might begin to speak of global capitalisms, neoliberalisms, and address their differences, their convergences, and why attending to as many scales as possible will serve us better analytically.

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Seven minutes after takeoff on July 3, 1988 Iran Air Flight 655 plunged into the Persian Gulf, killing all 290 people on board. The flight was to be a routine "milk run," a regularly scheduled transit ferrying business people and families from Bandar Abbas to Dubai. Instead, the plane was torn from the sky, brought down by two American anti-aircraft missiles. The USS Vincennes, a high-tech missile cruiser that had been dispatched to the Gulf only weeks before, delivered the fatal blow. The downing of Flight 655 marked a particularly important moment in the late 20th century history of the Gulf and in the relationship between energy, war and global capitalism.

The attack ushered in the beginning of the end of what had been a long and bloody war between Iran and Iraq, convincing Iran that it could not win against both Iraq and the United States, which now seemed fully committed to taking on Tehran militarily and at any cost. Indeed, prior to the late 1980s the US had deliberately avoiding dispatching its military to the region, preferring to empower proxies instead. Something changed in the 1980s. The attack also reflected something more complex and uncertain about the character of the broader conflict that was settling in. While the US and its allies would go on to wage conventional campaigns in Kuwait in 1991 and again in Iraq in 2003, the moments in between and after can better be understand as a kind of quasi-war – not war, but also not its absence. The condition of almost war, in which the military was engaged in hostilities that aimed to "contain" Iran, was set in place in the late 1980s.

How had the US arrived at this point and how we should think about the moment? Why did the United States pursue the path of militarism in the late 20th century Middle East? What were the effects of these decisions in the late 1980s and what kind of political, and political-economic, order did they help create?

Perhaps not surprisingly, the downing of Flight 655 was rooted in a shifting politics around energy, and, in the making of a regional order in the 1980s in which "energy" and "war" became increasingly interdependent. The United States had intensified its military presence in the mid-1980s ostensibly to protect the flow of oil from the Northern Gulf at the request of Kuwait, which wanted the US to protect its tankers from Iranian fire. Protecting oil's flow should be a familiar claim to even casual observers of the region, and, as the apparent the fulfillment of a vision of "energy security." This is a central tenant of American claims about its role in the Gulf still today. This neat division of energy and security into related but still separate categories misses the more important ways in which the two have become inextricably connected to and physically and technologically built into one another, however. To understand this, and to understand how military power, security, and energy, were integrated in the late 20th century, it is necessary to look closely at the

ways in which the Gulf was remade physically, geographically, and politically in the closing stages of the Iran Iraq war. The transformations taking place reflected a shifting technopolitical system, in which the material means of distributing and moving both energy and the machines of war embodied a new order of things. It is a system that has endured ever since, rendering the militarization of the Gulf and of energy not only permanent, but also forever understood to exist as in a state of vulnerability and crisis, conditions that serve primarily to justify more war and more militarization.

From the mid 1980s the United States and its allies in the Gulf, a group that included the governments of Kuwait, Iraq, Saudi Arabia, Bahrain, and others, understood that controlling and protecting the flow of oil required the creation a physical network, a mobile infrastructure on the fluid waters of the Persian Gulf, that enabled their own movement, assured their primacy, and that simultaneously limited the mobility of Iran. In the early 1980s, it was Iran that enjoyed the most freedom of movement in the Gulf. From the perspective of the US and its allies, it was an arrangement that had to be overturned. In pursuit of these objectives, the American-Arab oil producing axis helped build an order in which existing objects in motion, most importantly the giant supertankers that transported Arab oil, were linked to new ones, including US military warships as well as new kinds of militarized technologies on both the sea and in the air. The result was not a system in which energy was *just* protected. Rather, it was a system in which energy, the "military," and war all became vital and constituent components. Moving oil was critical, of course. But equally important, was the creation *and* protection of the militarized system of transportation and distribution itself.

In creating a new technopolitical order around energy and war, the United States and its allies engaged in a struggle to make and unmake space and movement in the Gulf, to create both a system of surveillance and control that privileged themselves as well as in a struggle to refashion the political geography of the region. By doing so they challenged, ignored, and reshaped what had previously been traditional rules governing sovereignty, boundaries, and the movement of people and things. Indeed, among the political changes ushered in by the creation of the new system were challenges to the prevailing sovereign order and the place of nation-states and their boundaries. While some borders continued to matter, in places like the southern Gulf and the Strait of Hormuz, sovereignty was increasingly attributed and connected to the ships and other objects in motion. The fluidity of the Gulf, the fact that both the seascape and the objects moving on it, were always in motion, gave rise to a corresponding fluidity in the technopolitical and geopolitical order in the region. It was both making certain kinds of mobility possible and closing off other kinds that were prioritized. The result was the system was, according to those who sought to control, always in crisis and, thus, always at war. It has been every since.

3 thoughts on “Capitalism and NeoLiberalism”

1.  Lino CamprubíOctober 4, 2013 at 4:07 am

Simultaneous panels.
The panel Toby C. Jones announces is a promising one and it’s a pity that it coincides with the one I’ll be participating in, called “technology and global geographies”. I will use this new opportunity offered by SHOT Talk to bring together some common topics of the two simultaneous panels that would otherwise miss each other. My fellow panelists and I will also discuss 20th century global political economy. Our focus won’t be on energy and war – although there will be plenty of both – but on the making of international economies at very local sites. Producing economies of global scale is no easy task and it requires to mobilize scientific and technical devices that make possible the circulation of people, materials, and techniques and that help supressing obstacles to that circulation. This goal has been indeed a matter of both security and profit, for it amounted to the creation of a new international order that would transform the colonial world without challenging its power imbalances. As such, the effort to create global markets has often been shared by private and state actors. As Toby suggests, investigating this process provides an opportunity to challenge the clear cut distinction between these two realms (the market and the state) proposed by the ideologues of neoliberalism (and shared by many of its critics). Stretching the argument one could say that, rather than forming two separate worlds, the very ideals of neoliberalism were made possible by the practices of state violence that allowed for global circulation. Timothy Mitchell has proposed the term McYihad to account for this kind of intermingling for the particular case of the oil economy. In our panel, fertilizers, water, and oranges were moved geographically by similar entaglements established along the nineteenth and twentieth centuries.
Putting science and technology at the center of these developments, as both our panels do, will hopefully contribute to SHOT’s ongoing efforts to provide new insights into the making of contemporary societies. Personally, I would be greatful if someone could record the president’s panel on “capitalism and neoliberalism” and upload it to the Internet. But this probably belongs to the general discussion on how to increase SHOT’s visibility.
See you in a week!
Lino Camprubí
(TEUS / UAB)

Edit

2.  Gabrielle HechtOctober 4, 2013 at 4:02 pm

I second Lino’s lament concerning the scheduling conflict (I’m to offer a formal comment in the other panel) — the two panels are indeed highly complementary.

Taken together, the blog posts by Toby, Keith, and Nina point us to complex, unevenly global technopolitical orders (Toby is totally right to pluralize capitalismS and neoliberalismS). States have not given up their capacities for projecting power through violence – even as they seek to partially privatize not just the production of the technologies of violence (long

true through defense contracting) but also the actual execution of violence (viz, Blackwater). They have, however, shed a great deal of responsibility for maintaining domestic infrastructures (even Sweden!). Toby writes that the inextricability of energy and war – indexed by the term "energy security" – has produced a condition of perpetual vulnerability and crisis in the Middle East. This made me think of new work by anthropologist Joe Masco on what he calls **national security affect**: a feeling of permanent existential threat, an emotion deliberately cultivated by the American state (and exploited by the culture industry) to foster fears among citizens. Such fears not only serve to legitimate, but also create a demand for, a state apparatus that operates in a condition of permanent, open-ended alert. Constant crisis thus produces and justifies the US counter-terrorist state. This legitimates security infrastructures designed to meet counter-factual scenarios at the expense of health and environmental threats, failing public education, aging infrastructure, and any other number of dangers that threaten US society. The threats that get funded, Masco argues, are the ones that can get militarized. Is this peculiar to US society, I wonder? A question I'd enjoy discussing, were I able to attend this panel.

Keith, for his part, suggests that ICTs might be the technopolitical motor of African societies shaped by neoliberal ideologies and dynamics. He hints at the way these ICTs operate in both the formal *and* informal sectors. This does indeed suggest a set of concrete research questions for social scientists studying technology (I'm one of those SHOT members who doesn't believe that we can or should maintain a disciplinary boundary around the **history** of technology). One possible starting point: can a study of technological **use** (invoking another panel) help us get at *how* formal and informal activities are entangled, and what forms of power and powerlessness are produced by those entanglements?

Finally, Nina talks about Swedish nostalgia for a previous era, one in which (or so people think they remember) public infrastructures worked the way they were supposed to. One of the stranger experiences I had in while doing research in southern Africa (both South Africa and Namibia) was hearing a similar nostalgia – not for the institutionalized racism of Apartheid, but for certain functionalities of the Apartheid state. And for employment. Nothing produces nostalgia like worklessness.

Edit

3.  Robyn d'AvignonOctober 8, 2013 at 12:42 pm

My comment responds to Keith Breckendridge's post, which spurred analysis of my observations on the unfolding of a new biometric regime in the Republic of Senegal – where I am currently conducting dissertation research – and some of the interesting questions this opens up for scholars of technology, infrastructures and labor in the global South.

In July 2013, Senegal introduced a biometric visa requirement for non-citizens, administered through an outsourced company that also furnishes India with biometric services. The Senegalese press extensively covered the introduction of biometric visas, but less pronounced were state programs, introduced earlier in the year, to "track" its own employees through fingerprinting and biometric identity cards. This campaign revealed, for one, that dozens of people on the state payroll were in fact dead. Other individuals were featured twice on payrolls, under both their legal and pet names. Biometrics thus allowed the state to

eliminate the payment of multiple salaries to single persons, increasing, in principle, the transparency and efficiency of the state and its allocation of limited resources.

But there is an untold story to the Senegalese state's new biometric regime: not all of the double salaries went wholesale into the pockets of local bureaucrats. Rather, many bureaucrats used portions of these "extra" salaries to pay for part or full-time assistants (often women and youth) to execute many of the mundane filing and organizational tasks of everyday bureaucracy that have become increasingly difficult to perform with a shrinking number of "formal" state jobs coupled with the administrative demands of a growing population. The elimination of redundant, or deceased, employees through biometrics also eliminated this informal job sector, introducing, at least in the medium term, an extreme slowing of several state ministries charged responsible for thousands of teachers and nurses, among others. To date, thousands of administrative documents have been "back filed" in overflowing cabinets or discarded in crumbling boxes and storage rooms until "further notice".

I offer this anecdote as one example of how new biometric regimes in the global South are reconfiguring the politics of informal and formal labor and everyday negotiations among state policies, local bureaucrats, and citizens. Biometrics holds the promise of reducing corruption, but also unfolds upon highly divergent histories and logics of national bureaucracies, some of which work (at all) precisely because they rely on flexibility and informal labor within the shrunken formal labor system. Keith's comments on the infrastructure of contemporary citizen and biometrics in South Africa generates productive questions about how historians of technology might interrogate the interaction of global biometric regimes with more nationalized or localized ways of getting work done and accounting for people—both living and dead. Much scholarship remains to undertaken to understand how the technical histories of specific state bureaucracies shape the possibilities and pitfalls of tracking people and money via biometrics.

The Computational Turn in the History of Technology

Kevin Gotkin and Charles Berret

Historians of technology are uniquely positioned to contribute to the digital humanities, a fledgling field of scholars who apply new media in their research and teaching. Organizations like SHOT and publications like *Technology & Culture* have spent decades in dialogue about some of the central topics in DH — computing, information, and communication networks — but by and large we work with a traditional historian's tool kit. Beyond other disciplinary investments in this emerging field, historians of technology are perhaps best-suited to incorporate new technologies into our own processes for writing histories about these same technologies, a bootstrapping cycle that might open doors to new kinds of scholarship. The purpose of this workshop is to begin expanding our kit with the tools of digital humanities, and to consider how historians of technology could become a greater presence in the development of DH.

While new tools and techniques might not fundamentally alter the rigorous historiography our field has cultivated, we start from the premise that new ways of thinking in DH can elucidate and expand our methods. We will begin with some remarks on the brief history of digital humanities, the figures who have shaped its development, and the projects that exemplify its promise. It's also worth pointing to some of the misfires that cast doubt upon the legitimacy of DH, and the dissonant landscape of practitioners that make the field itself difficult to define. We will ask why centers for DH are multiplying even as they remain marginal in the academy. We will consider which aspects of the field historians of technology may choose to adopt, and which we might attempt to redirect at this formative moment in DH.

The second part of the workshop, which will comprise the majority of the session, will look at two DH methods that may interest historians of technology. Kevin Gotkin will lead an introduction to 3D printing for historians of technology. Printing objects that have been lost from the archive (or perhaps never were viable for inclusion) might lead some material culture scholars to different practices of looking at objects that can depend their traditional analyses. We will move step-by-step through a very basic 3D model and print process. Charles Berret will lead an introduction to some practical programming skills that historians might use to gather, sort, and visualize large amounts of information. We will tackle basic command line functions and learn to adapt the considerable resources of shared code repositories — even when you don't read the programming language in which they are written.

This is academic hacking, and it opens new vistas of inquiry beyond the traditional archive. We are committed, therefore, to fostering a capacious methodological program for the history of technology that can push our scholarship into new territory that lives up to the legacies we draw from.

5 thoughts on "The Computational Turn in the Histories of Technology"

1.  Paul EdwardsSeptember 30, 2013 at 3:55 pm

   Digital humanities are of enormous interest in Communication Studies departments and iSchools (schools of information, of which there are now over 25, some of them employing historians of technology). I have several PhD students watching the movement. These methods hold considerable promise (in fact more in our field than in most), but they represent a huge departure from traditional historical methods. SHOT should welcome and support experimentation in this area.

   Edit

   1.  Joel HowellOctober 5, 2013 at 11:38 am

      Indeed so, but there's also the challenge of being integrated into history departments, some of which are going to be more welcoming to these methods than others.

      Edit

   2.  Ian KingOctober 13, 2013 at 9:35 pm

      Yes, I'm finding myself in that intersection, too, as an iSchool PhD student looking to bridge between new methodologies and the history-of-technology status quo, the latter itself seemingly considered somewhat contrarian within the scholarship of history. In addition to my hope of finding new lenses of greater resolving power, I am also making a conscious effort to establish methodology that will readily map into prospective thinking in technology – history that serves the future. I wish I could have attended this weekend, but funding isn't what it isn't….

      Edit

2.  Francesca BrayOctober 3, 2013 at 10:14 am

   On 3-D printing and its potential for historians of material culture, Dagmar Schaefer 's blog for the panel on Materiality brings up closely related questions about DH and simulation. Good to see how our themes intertwine!

Edit

3.  Erik RauOctober 6, 2013 at 5:35 pm

I look forward to this session and hope that those attending the pre-conference Debbie Douglas and I organized at MIT for Wednesday morning will participate as well. DH, despite the imprecision of the concept (is it an approach, theme, set of techniques, a theory, none, all of these, some of these?), will affect every aspect of our (and any historical) profession. Whether research (where digitization, large data sets, and data mining is likely to change at least some of the "back end" part of our projects), publication and outreach (where social media, short-form public presentations, and other forms of "front end" public engagement is necessary to establish relevance in a world more likely to challenge the humanities in the future), or teaching, we need to develop a basic level of fluency in DH and, more importantly, need to shape the conversation and pass along these skills to the next generation of historians of technology.

Edit

How users mattered

One of the key points about the sources or materials that we historians of pre-modern societies have at our disposal is that typically they provide some form of user's perspective. Our problem is not that we can't see the users for the inventors. On the contrary, inventors or innovators are often hard to trace at all. Yet we often find ourselves pressured to focus on innovation, or its absence, when our sources invite a much more organic approach to tracing how technology mediates social processes.

To give just one example of how a user focus can work in the kinds of pre-modern society that I study: in the case of domestic architecture in imperial China, I would argue that over the centuries I can trace shifts in the balance between several distinctive registers of use (domestic spatial practices, along with readings of space and its associated ethics and identities – I suppose one could say that several 'user scripts' are simultaneously embodied in the single material artefact of the house). These shifts in the uses and reading of domestic space did not result from innovations in building technology or even in architectural convention, but they do correlate with significant social changes. I feel that what I learned from looking at users of space in imperial China was very helpful in understanding the evolution of domestic space in post-WWII California, and vice versa.

Mats Fridlund
Aalto University

Two new political and material histories of use

What is the power of technologies to change its users, what is the material politics of things to transform subjects and societies? Those questions drive my research as an historian of technology in general and as a historian of technology of terrorism and political violence in particular. Through my research I aim to provide object lessons in how historians of technology can contribute to more material and intimate political histories by telling two different political histories of technology in use and of the material power of things; histories which differ from traditional 'object histories of technology' about the invention, design, innovation, and manufacturing of technologies and of individuals and institutions creating, manufacturing and operating (new) technological objects. These new histories of technology of use differs from recent user histories primarily focusing on use as *shaping technology* through object histories of users as either active technological co-designers, innovators and adapters or as passive faceless consumers targeted by corporate and communal technological representations, scripts and values.

As a first complementary and corrective I am advocating for more 'subject histories of technology' emphasizing the self-fashioning power and personal politics of technology in use. Such histories focus less on the symbolic and discursive meanings of technological objects than on technology as a form of *subject politics* and on technological use as *shaping subjectivity*: histories of the impact of use on an individual level and the visceral power and agency of material things to make people feel, experience and relate to their worlds and their selves differently.

In my research I use user testimonials to demonstrate how technological materialities - such as gas masks and fallout shelters - transform subjects by creating new sensibilities, such as those of fear and security. One such example is provided by *Britain by Mass-Observation* (1939) which before the outbreak of WWII quoted a British woman crediting the newly distributed gas mask for creating a sense of warmindedness among the British population: "No one wants war, that's the point, though I think it took the gas mask to bring it home to people. It taught them a lesson. They, like myself for instance, are thinking more about things now." Other testimonials show the gas-mask transforming British subjects through its mundane material reassurances of security and protection as well as of death and destruction.

Such histories of use hould also challenge some of the history of technology's central conceptualizations. use but also how technology problematize and challenging how technological use is conceptualized. One way is through that the study of gas-masks could be described as a history of technological *non-use* in that it primarily treats false starts and never realized dreams and nightmares. But this would be wrong. Gas masks and fallout shelters still *have been used* and worked through the comfort as well as the anxiety and fear they provided their users, uses that existed and worked regardless of whether these things actually would have been able to protect

their users if the gas would have been released or the Bomb exploded. This should challenge us historians of technology not only in how we think about technological use and functionality but also in our overall conceptualizations of what we dis/count as ‘technology’.

My other central interest in the use of technology relates to that it is often seen as controversial to argue that using certain technologies can drive or even determine political outcomes by privileging certain social behaviours. Countering this is the prevalent emphasis on demonstrating the possibilities of ‘reading’, reinterpreting and shaping the possible meanings of technologies and the (interpretative) flexibility of their various uses. However, this often ignores to what degree users’ social choices are already materially circumscribed, limited or predetermined by technologies – how, as Claude Fischer (1985) has described it, the “use of a technology alters material and social givens, creating new options for and new constraints on individual actions”.

As a way beyond these determinist and discursivist positions and a new opportunity to re-address the question of how technology through its uses has shaped politics I have found fruitful a focus on ‘sociotechnical affordances’ as a concept that can capture technology’s enabling as well as constraining social role. These are the possibilities and enablements for social action that a technology makes possible and are primarily material and beyond and beside discourse in that an affordance is the relational outcome of when a user’s specific skill capability is matched by a technology’s material functionality; a pocket calculator affords the ability of calculation if it has the proper software and hardware for calculation and a potential user knowing arithmetic.

In my own research I use sociotechnical affordances to explain the origin of using terrorism as a prevalent political practice. In this perspective, modern terrorism emerged in the 1870s not primarily with anarchist ideologies but with social revolutionary propagandists discovering the unintended affordances of small revolvers and explosive dynamite for spectacular propaganda by violent deeds. To uncover how such new powerful technologies afford the ability to choose to use terrorism we must look beyond what social interests and ideological motivations favoured, to consider what new material designs and technological functionalities made doable. In this way, new material histories of technological use can be the starting point for new material histories of technological politics, asking not just what politics were ideologically favourable but also which politics were practically usable.

Tisha Hooks
Blog Post: Users: Cultures of Use: Histories of Technology beyond Invention and Innovation (573 words)

I work on duct tape. It's distinguished among more recent technologies by the fact that there is no originating patent. And thus, the story of duct tape is, more than anything, the story of its uses and users. And from Sigfried Giedion's discussion of product catalogues in the seminal work, *Mechanization Takes Command,* to the employment of advertisements or correspondence from consumers as standard historical evidence in countless works, users are valued historical actors. Clearly, by considering users we learn how they apply technologies to their own lives, to the solving (or generating for that matter) of problems on large and small scales. We see the reinvigoration of further scientific discovery, be it in response to the demands of the marketplace or because a new invention has made something else longed for possible. (We often forget that scientists and engineers are users too. See Amy Slaton's work on reinforced concrete and the development of the skyscraper, for example.) Or we see what doesn't work or what doesn't make it, such as when technological innovations fail to decrease housework as described in Ruth Schwartz Cowan's classic *More Work for Mother*, or the early electric car famously "killed" by the investment of corporations, a government, and millions of users in a gas-powered option.

But we can do so much more in our thinking about the role of users, which is why I'm so pleased to be a part of this discussion. As both Arwen Mohun and William Storey point out, using a technology gives one a completely different perspective on how and why it works or doesn't, the materiality of it, the way one feels physically and even emotionally

when operating it. However, as has been noted here, and despite the scholarship to the contrary with which I began this piece, technological history is still presented as the story of inventors and inventions, the scientist or the engineer, and the laboratory. It's important and enlightening work. But all too often, the result of such inquiries reveals little of the most significant aspect of technology—that it is *applied* knowledge, which doesn't end with the securing of a patent or getting to market. And while the story of the creation of a technology speaks to the applications of scientific discovery, after its invention the users hold sway.

Duct tape is a tool that is purchased and tossed into toolboxes or backpacks because of its *potential* to be useful (within a certain set of affordable options as Mats Fridlund might rightly argue). Often that potential displays itself in an ingenious, inventive moment by the user. For when duct tape aids in a repair or repurpose, in the re-making of order out of disorder, it can result in Promethean acts. And while there is with good measure some resistance to the idea of turning users into inventors, I would argue that it is these creative efforts by users that remind us that ingenuity is an everyday occurrence, the innumerable examples of which rarely make it into the traditional archive. The consideration of the user as coinventor or creator wrests the idea of technological innovation and mastery from the hands of a few, and distributes it more widely. It opens the door to the study of new histories, even broader understandings of how we interact with the technologies that populate our lives, and offers insight into the relationships that Giedion argued give meaning to history.

Tisha Hooks's Blog: http://www.hastac.org/users/tisha-hooks

Arwen Mohun
University of Delaware

Technological Knowledge and the Agency of Users: Why Should We Care?

How did Americans in the past learn to sew a dress or drive a locomotive? What did having these skills mean in terms of status and opportunity? How did changes in technology and society alter what people needed to know to get a job, make a home, or travel from place to place? These are some of the questions I use to draw students into History 411: *Do It Yourself America*.

It's not until the first class meeting that I explain that this is a history of technology course and that they'll be learning about the topic of skill or "technological knowledge" in American history. For the rest of the semester, we read books and articles that would be familiar to many members of SHOT by people like Judy McGaw, Nina Lerman, Ruth Schwartz Cowan, Merritt Roe Smith, and Kevin Borg. We also watch films and read various kinds of primary sources. "The Midwife's Tale" based on Laurel Thatcher Ulrich's prize-winning book is chocked full of technological knowledge. So is *Two Years Before the Mast*. We also try a variety of what I call "experiments" including learning how to sew a hem; calculating the weight of the forty-gallons of water that someone like Martha Ballard would have needed to carry in order to do her family's laundry. Then we use buckets to haul some water out of one of the campus fountains and across a quad (which feels deliciously subversive besides making a point).

By the way, I mostly leave out the kinds of technological actors that the students are most familiar with: inventors and other kinds of experts. This course is rooted in social history and frankly, these particular students could care less about Thomas Edison or Norbert Wiener.

After teaching the class three times, I can say it works really well. I'm most tickled that the water carrying experiment has now trickled down into the high school curriculum in Delaware. Why does the class work? To put it simply, because we are all users of technology and the framework of technological knowledge allows us to put ourselves imaginatively in the past and also to recognize what we learn there as relevant to the present. Hence the title: Do It Yourself (no hyphens on purpose).

The course also makes students aware that the creation, dissemination, and deployment of technological knowledge is a pervasive, if largely taken for granted part of history. It's a seeming paradox of the history of technology that it often makes *people* more visible and that when people become visible, it also becomes apparent that technological knowledge is gendered, raced, classed, and historically contingent. "Do Artifacts Have Politics?" Langdon Winner asked rhetorically. Certainly! At least when it comes to knowing how to use them.

What I don't tell students is that within SHOT, technological knowledge and skill as it pertains to people other than scientists, engineers, and inventors is a little bit of a historiographical backwater, especially in the last decade as social history has receded into the background,

especially among historians of the United States. This is not for lack of interesting research topics. We've only begun to glimpse the wide range of actors in what Kevin Borg calls "technologies middle ground." In his book, Joe points out the enormous gap in communication between makers and users of modern consumer technologies, but we could profitably learn a lot more about why that gap exists and what goes wrong (or right) because it exists. To give one more example: we know very little about what role technological knowledge plays in the social relations of African American and Native American communities.

Bill Storey (History Department, Millsaps College, Jackson MS)

"Cultivating Empathy for Technology's Users."

A blog posting prior to SHOT's 2013 meeting in Portland, Maine.

As a graduate student at Johns Hopkins, I did not study the history of science or technology. I studied about the British Empire and Africa with historians who had strong interests in economics and anthropology. I had never heard of SHOT, SCOT or of such things as end-user modifications. My introduction to the history of technology came in a seminar where we read and discussed Daniel Headrick's *Tentacles of Progress* and Michael Adas's *Machines as the Measure of Man.* I liked these books very much but their focus on European ideas was somewhat at variance with what I had been learning from anthropologists and social historians about the politics of local knowledge under imperialism. I became skeptical of the model developed by Lucile Brockway and later picked up by Bruno Latour that imperial power depended on scientific centers of calculation. I went in the other direction, looking for ways in which local knowledge challenged or modified imperial practices.

In 1992, I spent a years as a Fulbright scholar working on the island nation of Mauritius in the southwest Indian Ocean. I was researching and writing a Ph.D. dissertation about the history of sugar cane breeding, the science that made colonial agriculture possible. In the nineteenth century, the type of sugar cane that was grown, the Bourbon cane, became susceptible to diseases. Productivity declined at the same time as competition from European beet sugar rose. The estate owners – who were French, not English - clamored for new canes. First in the 1860s, these were imported from the Pacific, where canes originated. In the 1890s, the planters funded a research institute for agronomy and breeding. Next, starting in 1913 a scientific department of agriculture began to breed hybrid canes systematically. Pathogens adapted to the canes ever more quickly. The Bourbon cane had been in cultivation for more than a hundred years; mid-twentieth-century hybrids lasted about seven years. The process of investing more and more in scientific breeding remained steady, even through decolonization and democratization. The new canes sustained the industry that sustained the new state. Yet much still depended on the choices of the Pacific gardeners who made the initial cane selections; the actions of so-called pests, including insects and fungi; as well as the geographical constraints on cultivation and selection. Key selections in the British department of agriculture were debated between British-trained scientist-administrators, on the one hand, and Franco-Mauritian assistants, on the other, many of whom had grown up in families that owned or managed sugar estates. Their knowledge was key for the development of better canes.

The local knowledge of Franco-Mauritians became incorporated in the British department of agriculture. This became the main subject of my dissertation and first book, *Science and Power in Colonial Mauritius.* That was not all. The Mauritian sugar industry was divided between large estates and small planters, most of whom were descended from Indian indentured laborers. I learned that in 1937, small planters rioted because a cane variety that they selected themselves, the Uba cane, was rejected by the estates' mills. Anti-estate, pro-Uba riots were the turning point in the Mauritian independence movement. Subsequent attempts by the state undergoing decolonization took small planter needs into account. That was described and analyzed in the book, too.

It was only during a postdoc year at Cornell, in 1994-95, that I became aware of SCOT, SHOT and a host of issues related to the history of technology, all of which helped me to revise the dissertation and engage broader audiences. For the purpose of today's presentation, I simply want to note that engagement with the literature on local knowledge may help historians of technology who work on users. Local knowledge has been taken up much more strongly by environmental historians than it has been by technology historians. At the time, my thinking was influenced by our SHOT colleague Deborah Fitzgerald's book about corn, *The Business of Breeding,* as well as by an anthropologist, Paul Richards, who wrote a monograph called *Indigenous Agricultural Revolution* about rice growers in Sierra Leone. As I worked on the thesis and revisions, I discovered Lance van Sittert's articles about South African agriculture and ecology, as well as Sheila Jasanoff's publications about the tensions between local and global knowledge and governance.

A second way that I approached end-user modifications was to get out of the library and become a user myself. Shortly after finishing the dissertation, I found myself living and teaching in Mississippi, where my father-in-law owned a large piece of land in the country. With his help, I tilled up about half an acre and tried to teach myself gardening! I had done some gardening before, but never anything on this scale. Among other things, I wanted to cultivate more empathy for the Mauritian farmers and extension officers that I had met. Obviously Mississippi is not Mauritius; instead of growing sugar canes or tropical crops I grew locally suitable crops, experimenting with different types of tomatoes, peppers, okra, squash, pumpkins, and beans. The watering and weeding in a Mississippi summer nearly killed me. I did get a better appreciation for what it is like to be a farmer, that is for sure. And much to my delight, the next spring I discovered that the pumpkins and squash had crossed naturally, forming what my wife, Joanna, called a squashkin. Twenty years later there are still squashkins growing out on the farm.

A key tool, then, in developing empathy and understanding for end-users is therefore to become a user oneself. It is often difficult to find records of how end-users experience or modify technologies. A key tool in the historians' kitbag is to get some hands-on experience. This approach has been taken already by a number of historians of technology – witness, for example, Kevin Borg's recent book about auto mechanics. My sense is that it is healthy to cross the heavily constructed boundaries between practitioners and authors.

The method of learning to use technologies proved to be something of a challenge in my next research project, a history of guns in nineteenth-century southern Africa. I began this project in the mid-1990s, out of concern for the legacies of firearms proliferation in postocolonial countries. In southern Africa, one of the legacies of regional conflict from the 1960s to the 1990s was that firearms had flooded the region. In some places, an AK-47 could be bought for the same price as a few chickens (which either says something about the surplus of weapons or the scarcity of chickens). In any event, a research trip to England and South Africa revealed that the nineteenth-century breechloader revolution had resulted in a flood of weapons to the region, too, and that African gunsmiths frequently made end-user modifications to European firearms. Firearms history was not a story of Europeans developing and imposing their goods on third-world markets. Instead, local modifications and environmental conditions were significant. All this is discussed in my book, *Guns, Race, and Power in Colonial South Africa.* I also looked into the ways in which debates about user skills with guns related to imperialist efforts to disenfranchise African people.

In the course of several years of research on guns in southern Africa, I accumulated many papers and books. Yet based on my earlier work on farmers, I knew that I was deficient in one area: I did not know how to use firearms, and based on my experiences with gardening, I figured that I would learn

something about guns by learning how to shoot. I had grown up in the suburbs of Long Island in the 1970s and then spent the 1980s and 1990s in boarding school, college, graduate school, and postdoctoral training in the Northeast. During that entire time, I never even laid eyes on a gun, except the ones in the holsters of police officers. I did not know any civilians who owned one (at least that I knew about). I had been hunting once, in Mauritius, when I was invited to attend one of the wealthy estate-owners' hunts, but that was a staged event, where the hunters sat in chairs and the beaters drove the animals before them. I returned from South Africa to Mississippi, where most of my neighbors probably own multiple weapons, and I enrolled myself in a pistol course at the local shooting range. After an evening of classroom work with the teacher, who was an off-duty police instructor – about firearms laws, the parts of firearms, how to clean the pistol, and so forth – I was standing in the bay of a shooting range, wearing hearing protection and glasses, firing a police revolver at a paper target ten yards away. Pow, pow, pow. This was actually a lot of fun. It even turned out that I was pretty good at this. Several weeks' worth of practice convinced me that I was fairly accurate even at 25 yards with a .357 Magnum Smith & Wesson 686, a large revolver that makes a big pop. The high point of firearms training for me, though, was learning how to fire a muzzle-loading rifle, of the type commonly used in the mid-nineteenth-century. A friend who is a very experienced hunter took me out to a wooded area that he owns and he showed me the components of the muzzle-loader, how to load it, and how to fire it. I told him that I had never done this before – always a good confession to make with a dangerous technology – and he pretended to be nonchalant as I lay prone with a loaded musket and took aim at the bulls-eye style target fifty yards away. I took a slow deep breath, exhaled, and squeezed the trigger. KA-BOOM there was a big puff of smoke from the black powder. My friend and I walked to the target, unable to see a hole. As we got closer we saw it – a perfect bulls-eye! This was too much fun. After some more shooting, we left, with my friend convinced that I must have been fibbing about my inexperience with weapons.

As much as I enjoyed myself, learning to shoot taught me some key lessons. Lesson One was that I did not want to have a weapon in the house while my wife and I were raising a family of five kids! These things were easy to use and could do a lot of damn damage! I remain a typical northeastern cosmopolite living in the reddest of red states. The other thing that I learned was that on the range, or in the woods, carrying a weapon had the effect of making me think differently about the world around me. All of us historians have read, written, or taught about the issue of technological determinism but in this blog posting I do not hope to bark up that tree. Instead, I felt like this experience of carrying and using weapons shed some light on an issue in technological use – ontology – the way in which the tools that we use shape our own sense of being. With a weapon in my hands or on my belt, I felt an elevated sense of risk and power relative to my surroundings. This may have been the effect of an over-active imagination on my part, but I felt like I was engaging with an issue that I had first encountered as a graduate student reading anthropology, in particular the work of the John and Jean Comaroff, who, in their trilogy, *Of Revelation and Revolution*, document the ways in which British technologies, including clothing, housing, and food, shaped a shift in consciousness among the Tswana, southern African people who were exposed to Christian missionaries such as John and Mary Moffatt and David Livingstone during the nineteenth century. At that time, I also learned that British officials, such as Sir Bartle Frere, governor in the late 1870s, even articulated concerns about the ways in which guns shaped African consciousness, something that Frere saw as politically risky. This leads me back to my comments at the SHOT plenary about the importance of materiality. To what extent do we allow for the role of material things, ranging from small technologies like guns or large things such as national parks, to shape our consciousness? This is a field of rich debate among some social scientists who work on material culture, but not so much for historians of technology. At least not yet.

I'll conclude by relating one of the most extraordinary experiences I have had as a historian of technology. Fifteen years ago I was walking through a South African vineyard, which I was visiting as part of a preliminary exploration of a book (still not written) about local knowledge in the wine industry, when I came across a hand-axe lying on the ground. I had seen these in archaeology museums – but on the ground? – this struck me as an incredible find. This was a so-called stone-age technology although my own "find" was probably not that old. I brought it to the attention of the proprietors, who were unimpressed – apparently these ancient technologies are pretty common on their land. Thus began my fascination with hand-axes. Nearly every archaeologist who writes about them has no written record of the technology being used. Instead, nearly every archaeologist writes about how flint-knappers make a hand-axe – very carefully. (For an example, see the wonderful descriptions in archaeologist Francis Pryor's popular book, *Britain B.C.)* The rock must strike the flint just so, giving it a precise, glancing blow, so the flint does not shatter. It takes a lot of practice for a flint-knapper to learn his trade. The flint-knapping is slow and careful. Watching a flint-knapper, as I have done on several occasions, gives one great appreciation for the technical skill of our ancestors. These inferences, based on the re-enactment of skills, are familiar to archaeologists, who have few written sources, but less familiar to historians, who put written sources on a pedestal. We historians do sometimes work without written sources, yet the physical objects, combined with some empathetic learning of the associated skills, can help us to produce more insightful histories about technology's users.

Roundtable Discussion Session: **Integrating SHOT Special Interest Group Concerns into Teaching: Rethinking Modes of Instruction in Diverse Communities**

Organizers:
Honghong Tinn, *East Asian Science, Technology and Society: An International Journal*, Taiwan;
Francesca Bray, University of Edinburgh, UK

Discussants:
Anna Åberg, the Royal Institute of Technology in Stockholm, Sweden
Gregory Clancey, National University of Singapore, Singapore
Marie Hicks, Illinois Institute of Technology, USA
Ann Johnson, University of South Carolina, USA (Chair)
Geoff D. Zylstra, the City University of New York, USA

We organized this roundtable session to encourage the SHOT community to discuss the way in which SHOT scholars have incorporated SIG themes in their scholarship as well as in their teaching practices. In recent years, several new Special Interest Groups (SIGs), such as the SHOT Asia Network and Exploring Diversity in Technology's History (EDITH) emerged in the Society for the History of Technology. Together with a myriad of well-established SIGs, such as Women In Technology History (WITH), the Prometheans, and Special Interest Group on Computers, Information, and Society (SIGCIS), SIGs have offered scholars homes of productive space and meaningful interactions during and beyond the annual meetings of SHOT.

While we are celebrating the diversification of SIGs as a community, the teaching concerns of the community should also consider the implications of such diversification. In the 2012 SHOT, after the plenary on "Transnationalism and the History of Technology: Lessons from Tensions of Europe and Other Projects," Ann Johnson brought up an interesting question—how do we mentor graduate students on working in transnational research projects, while we acknowledge the importance of transnational perspectives? As members of the International Outreach Committee, we were thus interested in organizing a roundtable discussion to discuss the three interrelated issues of the internationalization, the diversification, and the teaching practices in the community.

In this roundtable session, we would like to invite SHOT scholars to discuss (1) the possible contributions SIGs could make to advance the field's graduate student mentoring and undergraduate teaching, and (2) how the recent diversification of SIGs may shape our teaching of survey courses. This session will discuss the hows and whys in crafting a diversified pedagogical approach towards the study of technology's history, as well as examine the choices of scholars in identifying particular works or approaches in their teaching at both graduate and undergraduate levels.

This session has invited five speakers to discuss how their SIGs incorporate their scholarly concerns in their syllabi, classroom activities, and graduate student mentoring:

Anna Åberg, with her experiences from **the Tensions of Europe** and **EDITH**, will share her thoughts on how SIGs can bring new perspectives to what some scholars perceive as a normative "canon."

Gregory Clancey, from the **SHOT Asia Network**, will discuss how we should present a full-bodied and richly-textured sense of how technologies have intertwined with Asian lives over the last few centuries in survey courses.

Marie Hicks, from **SIGCIS**, will discuss how insights from the history of computing impact teaching practices by talking about "outward-facing" or "web-facing" classrooms. She will show how this approach that can be used to encourage students to become more invested and engaged in humanistic discussions both inside and outside of the classroom.

Ann Johnson, from the **Prometheans**, will suggest in bringing the history of engineering into two different kinds of teaching—to engineering classes and to humanities classes—to discuss how the interaction of students in different areas of study can be made richer and more rewarding.

Geoff D. Zylstra from **WITH**, will talk about different ways that WITH scholars use gender-related categories when teaching the history of technology, as feminist historians have a long history of advocating the inclusion of gender-sensitive perspectives.

Besides the five speakers, we would like to invite the chairpersons of all SIGs and the audience to share their teaching experiences and join in the discussion of what should be brought into teaching, as well as what works and what does not work in different educational, intellectual, geographical, and social contexts.

Anna Åberg
Royal Institute of Technology

While writing this, I am attending the Tensions of Europe (ToE) conference in Paris, where I have witnessed the presentation of the first volumes of a book series (http://www.makingeurope.eu/www/en/bookseries), written based on the research done in the network. This book series attempts to rewrite the history of Europe through the lens of technology, and is the result of several research projects spanning over more than ten years and involving researchers from all over Europe. During the past years, Tensions of Europe has been what may be called a shadow-SIG, and although it differs from the other SHOT SIGs in several ways, I believe that the efforts made within the ToE to not only create a research agenda, but to integrate graduate and undergraduate education into this agenda can be of inspiration when discussing the issue of education within the SIGs. As a graduate student I have been able to benefit from the different activities within ToE, and I will discuss them briefly here. I am also affiliated with the newly formed EDITH (Exploring Diversity in Technology History) SIG, where we are just starting to discuss our agendas and activities after our first meeting at the conference in Copenhagen last year. I hope that my comments here can feed into this discussion.

Developing an agenda for education is all good and well, but how does one go about setting this agenda in motion in practice? One of the main tools for grad student education within ToE have been seven (so far) summer schools arranged all over Europe. These summer schools have been instrumental in creating sense of community amongst the grad students, as well as for developing common resources for reflection in their work. One important component of the summer schools has been their integration into the overall research agenda of ToE. Summer schools have been organized around the methodological, theoretical and topical interests of the different research groups, and thus they have been helpful not only for the students participating, but also for the organizers to get input on their ongoing work. The summer schools have also been a vital social and networking tool for the students. Another tool for informal exchanges has been the creation of a listing of grad courses given by participating universities all over Europe (http://www.europetechnologyhistory.eu/).

For me, one of the most important educational aspects of participating in the ToE network has been the inclusion of grad students in the transnational research projects together with more experienced researchers on different levels. Being taught in courses and seminars is one thing, but working with other scholars in practice provides an education in itself, and for me it has meant both a boost for my academic achievement and my self-confidence as a scholar. Both through the summer schools and the research projects, grad students have met scholars who have been able to act as mentors on several levels.

While grad student education is often closely connected to research, disseminating research results to schools and in the undergraduate education is not always as simple. While the earlier mentioned book series can, in a way be seen as an attempt to write a new "canon", and could be used in graduate education, it is not necessarily fit for other levels of education. However, another outcome of the Making Europe research project has been a virtual exhibit on the history of technology in Europe, which has as a parallel purpose to be used as a teaching tool for schools and in undergraduate studies.

(http://www.inventingeurope.eu/)
This portal sports several exhibitions and objects which can be explored by following virtual tours. The discussion on how to use this exhibition as a teaching tool has already started with a workshop held during the ToE conference last week, and hopefully this will also lead to a more prominent discussion of undergraduate education within the network.

These are some of the main efforts made in the ToE regarding education but the question is, could EDITH or the other SIGs create an agenda for education similar to the one that has been attempted within ToE? Should they? What could SHOT take away from the different educational approaches of Tensions of Europe? What is possible in terms of funding, and institutional cooperation?

Of course, writing what could be considered as a new canon in a 10-year-spanning research project involving well over 100 people and creating virtual education tools in the process is a daunting agenda and scope, and not something to be easily undertaken. However, thinking about spaces, both virtual and non-virtual, where grad- and undergrad student education can be discussed, and where exchange can be facilitated does not have to take a lot of funding or time. Common websites to promote courses, summer schools to develop mentoring and networking of grad students, and a broader discussion regarding future research projects and the possibility to create transnational and trans-institutional projects would be possible within the SIGs. Some of this is already been done informally, but it may help to think about how to formalise these efforts.

Having said that, however, I still think that there is something to be said for thinking big and developing a broader agenda regarding education. ToE and EDITH have as an explicit goal to work for diversification, both regarding the members of the networks, and regarding the intellectual agenda that we teach, shining light on new types of actors and histories. With these goals in mind it is especially important, I believe, to contemplate a larger agenda, or at least consider the visions we have of a different kind of canon, and a different kind of education, including our perspectives. While we work with everyday educational issues and practical and social ways of developing education, wanting to change the world is not necessarily a bad thing to be striving for in the end.

Marie Hicks, Illinois Institute of Technology

I am delighted to be able to represent the Special Interest Group on Computers, Information, and Society (SIGCIS) in this panel discussion of how SIG themes influence teaching and mentoring, and how they may help diversify pedagogical approaches. What follows is a version of the comments I will give at the panel.

Our SIG is sometimes viewed as the "computer history SIG" and while that forms an important part of what we do, I would like to start by emphasizing that it is only one part of what we do. Members of our SIG work on topics ranging from telegraphy to labor history, and from voice recognition to video games. Collectively, we are interested in much more than a narrowly-defined computing history: our mandate is to study how computers, information, and society interact, shaping the human experience in the process.

As a result, one of the main teaching goals of the SIGCIS is to help students learn how to contend with technologies of infrastructure that creep into all aspects of our lives, from the broadest to the most personal level. We aim to teach students how these technological infrastructures, and our interactions with them, not only structure our collective experiences and our daily interactions, but shape and define our humanity in the process. By now, it is generally taken for granted that we are all cyborgs. But the mechanisms by which we grow into our cyborg selves and the historical changes that underlie these constantly-shifting identities are still poorly understood--and often ignored. Showing students how to apply lessons of this history in specific, actionable ways is one of the SIGCIS's major pedagogical aims.

My comments fall into roughly three sections: the first two deal with how the content and topical concerns of our SIG influence larger pedagogical concerns, and the last one deals with teaching tools and media:

1. One issue that has been especially important for our SIG in both research and teaching is the issue of how to revise and rewrite narratives of information technology that have tended to privilege the West, and particularly the United States. Members of our SIG have continuously pushed the boundaries of where we should look for this history—changing the political, economic, and cultural meanings of this historical subspecialty in the process, and opening up a range of teaching possibilities.

For instance, Eden Medina's work on Chilean cybernetics raises questions about ideology, and computing as a tool for social change, in a context that is completely unfamiliar to most students but inextricably connected to Anglo-American history. This allows students to see old historical issues in a new light. Jenna Burrell's work on internet users in Ghana requires students to ask uncomfortable questions about user agency and who gets to define appropriate technological use. And Ross Bassett's work on computing in India shows how a major technological power has heretofore largely been written out of computing histories produced and consumed in the Anglo-American context.

One way to deploy these insights in a class, which I have used to good effect with undergraduates, is to give the class information that might seem to conflict with the narrative(s) presented by their main textbook. Then, I ask them to write their own "alternative" history based on this new information. Recently, I did an exercise with my undergraduate history of computing class in which I asked them to read two of Professor Bassett's articles which covered computing in India from the colonial period

through the Cold War. Then, I gave the students a carefully-selected bundle of documents from my archival research in the UK National Archives, which showed British and Indian officials wrangling with each other over computing—and the Indian officials taking the upper hand.

I asked the students to write a narrative of Cold War computing, based on these articles and primary sources, that offered an alternative to the U.S.-centric narrative with which they might be more familiar. Their responses astounded me with their depth of insight and complexity. I realized that even at the undergraduate level, giving students the tools and guidance to participate in the process of rewriting our necessarily flawed histories can be an extremely fruitful exercise. It mirrors our own interests, concerns, and research processes, and it helps undergraduates understand history more as a discipline and process than as a mere product to be consumed.

2. A second and related issue for our SIG that affects teaching and mentoring in our subdiscipline is the range of students we do—or do not—get the opportunity to teach in our classes. For instance, when I teach my history of computing classes, I am sometimes the only woman in the room, and also sometimes the only out queer person in the room. Increasing the proportion of women, openly LGBTQ people, and those who question the heteronormative labor assumptions that still haunt fields like computer science and electrical engineering is an important part of the work of many SIGCISers: Janet Abbate, Nathan Ensmenger, Helena Durnova, Jacob Gaboury, Jennifer Light, Laine Nooney, and Corinna Schlombs to name just a few. Here there is certainly crossover with members of WITH: I am reminded of Donna Drucker's terrific recent article on how the logic of punched card machines helped create Kinsey's scale for describing human sexuality.

My own work focuses on why the proportion of women computer operators and programmers in the UK fell as electronic computing expanded, and how this process of labor contraction hindered the technological aspirations of that waning superpower. A fundamental aim of my research is to tell a story that shows how integral women's labor is to nationally-critical high technology fields, even when their labor might not be valued appropriately or might cease to be present. It shows how absence, and the devaluation of labor, can be felt in many important ways, becoming triggers for other historical processes. At the same time, it paints a picture of early computing that few students are familiar with—and which many find heartening. To see that computing was not always a man's world implicitly promises that it will not always be one in the future.

Perhaps most importantly, it shows how the dictates of the nuclear family and the organization of the postindustrial state, in ways both general and specific, have led to the current labor situation in high technology and who feels welcome or comfortable in the field—or even just talking about the field. That I find myself the only woman in the room in many of my classes is a historical process that my students will benefit from understanding, and my classes address these issues head on, using the latest historical scholarship that explains the relationships between gender, sexuality, technology, and labor. I know that some of my students will take this forward with them into their careers, using the different situations they've learned about from the not-so-distant past to model less homogeneous workplace environments.

3. The final issue that I would like to discuss deals with content delivery, communication, and information sharing. The SIGCIS maintains a fully-featured website (www.sigcis.org) with a syllabus repository, member directory, list serve, and blog. In SIGCISers' classrooms, teaching technologies also play a variety of roles.

While I still teach with traditional face-to-face, mixed lecture and discussion methods in my classes, I have increasingly sought ways to use information technology infrastructure to extend the classroom's reach and impact. I have sought ways to make students' work more accessible to others in the class, to students surfing the web, and to interested parties at our university and beyond who would benefit from the important work that many students do over the course of a semester in my class. It frustrated me that even assignment responses that students might share with each other on our Blackboard course site would be lost behind that impenetrable wall of course management software once the semester ended.

In an effort to create an "outward-facing" classroom online that would add to the value of the class and engage the communications networks and cultures we are studying, I have almost all but dispensed with Blackboard, which now only functions as my document repository. I have transitioned to using a Wordpress blog instead, on which I ask students to periodically respond to writing prompts with short-to-medium length essays: www.mariehicks.net/blog. Sometimes these essays are straightforward and consist only of text, but the beauty of the medium is that students can also easily include links to documents, archival images, and so on. I do not post all of the students' work—only certain essays are "approved" and therefore made public in the comments. I do this to ensure that we do not carelessly add to the misinformation that abounds on the web, and also to give students a manageable number of their peers' responses to read and learn from. Since their writing will be public, for reasons of privacy and security I do not require students use their real names to post, though I know the identity of each poster for grading purposes.

A key part of this process is that it empowers students to use discourse as a tool, and allows them to see firsthand what we are teaching regarding the power and importance of information technologies. After reading about the effects of gender on infrastructure, (and the reverse), one of my technological history classes meticulously counted, described, and mapped the bathroom facilities on campus by gender and accessibility in order to make an argument about the formative effects infrastructure has on university culture. They showed how inadequate restroom resources for women and trans students created an othering, unwelcoming environment for these students, and they made a case for more women's and gender neutral bathrooms. Within a few weeks of their project being posted on my blog, the university administration showed interest, asking permission to use their data and their map to help create more gender neutral facilities and help in the ongoing effort to make our campus more trans and queer friendly.

In conclusion, I would just like to point out that the emphases of the SIGCIS, and the evolving body of scholarship that allows its members to teach new and unexpected versions of information history, are far more varied than I can cover here, and we hope to welcome more scholars each year who will add new perspectives. But I do think that one unifying theme—that of infrastructure's silent role in society—is an important commonality in the research and teaching of SIGCISers. From the hidden ScanOps workers toiling on the overnight shift at Google, to the exabytes of data collected by the NSA, to the

recent push for superstar-led MOOCS, SIGCIS histories are now more relevant than ever for teaching and engaging broader publics.

Focusing in on the infrastructures that imperceptibly and sometimes unexpectedly shape our experiences in postindustrial and industrial societies can be a powerful bulwark against the fuzzy promises of simplistic technological solutionism promoted by the less historically-minded and more technologically exuberant. This brand of naïve technological determinism grips the imaginations of many of our students today, particularly the engineering majors who fill many of our classes. But, we have the tools and the histories to offer alternative explanations and alternative roadmaps through our information society, ones that can empower our graduates to act more effectively as engineers and as humanists, and to be attentive to the deeper political impacts and unintended consequences of their technical pursuits.

How I Teach Gender in History (of Technology)

By Geoff D. Zylstra

I introduce gender into my courses early in the semester, not only because I prioritize gender and the inclusion of women in my teaching, but also because once introduced to the students, the concept of gender helps us utilize other theoretical methods of examining the past. The students and I use gender as an intellectual precursor to understand social categories and ideas such as race, ethnicity, class and even some ecological ideas. Once students see that categories such as feminine and masculine can be disentangled from female and male and once they understand the social and historical nature of these categories they can apply these ways of thinking to other situations and intellectual approaches. In a sense, I use gender like a machine shop, as a shop full of theoretical tools given to the students early in the semester that enable them to create more intellectual tools later in the semester.

In my history courses that focus on North America, I begin discussing women and gender norms when we examine the First People's (or Native Americans). The many tribes that lived in North America provide ample opportunity to show differing gender roles, particularly as they relate to production. For example, women from the Wampanoag and Osage People's did much of the agricultural work, using technologies that Europeans, when they arrived, associated with men. After discussing gender roles and norms, we move on to ways that these norms contributed to various social hierarchies. For example, Kathleen Brown, in *Good Wives, Nasty Wenches, and Anxious Patriarchs: Gender, Race and Power in Colonial*

Virginia, credits the gender differences between the First Peoples and the Europeans, as they related to agricultural production, with contributing to the creation of Chattel slavery in mid-seventeenth century Virginia. These kinds of cultural encounters that occurred in early American history and the differing social and technological arrangements between the various groups, helps me to introduce the concept of gender to my students early in the semester.

The students and I continue to connect gender and technology throughout my courses, using the "co-creation" model outlined by Lerman, Oldenziel, and Mohun in *Gender & Technology: A Reader*. By the end of the semester, (most of the) students in my history of technology class can both discuss the historical developments of masculinity and femininity as they relate to technology and see the gendering of technology that occurs around them on a daily basis. While I think that being able to use gender as a tool to analyze technology is important, I think that most historians of technology already understand this and hopefully already discuss the "co-creation" of gender and technology in their courses. So I am going to elaborate on how gender creates an intellectual foundation for other ways of analyzing and teaching the history of technology.

Part of the reason why gender is a useful tool to set up subsequent theoretical modes of analysis relates to its apparent binary nature and the seemingly direct connections between the biological categories male and female, and the social categories masculine and feminine. While I think these perceptions must be dispelled from students' minds as quickly as possible, they serve as useful

teaching devices in the classroom because students find them simpler than race and ethnicity and easier to discuss. When I ask students to define gender most of them respond with "male and female." This initiates a conversation about the difference between gender and sex, between female and male, and feminine and masculine. Technology and the broader material world wonderfully highlight the differences between these categories. Images of feminine and masculine bicycles, automobiles, razors, and domestic spaces quickly show the constructed nature of gender norms (and the associated technologies). Without much effort students can see that while gender and biology appear directly and naturally connected, people have made these connections and that the connections between gender and biology change over time.

Once I establish gender as a social construct, I shift to biology and try to demonstrate how the categories female and male have also been influenced by social structures and cultural perceptions. Thomas Laquer's work, particularly the images from *Making Sex: Body and Gender from he Greeks to Freud* that depict female anatomy as an inversion of male anatomy, starkly shows the influence of cultural perceptions on the historical construction of the categories female and male. Ultimately, I want students to see both gender and sex as spectrums instead of binary categories; masculine and feminine and male and female representing poles on these spectrums. Students who can conceptualize sex and gender as spectrums and who understand that they possess varying degrees of male and female biology and know that they can easily adjust their gender identity, not only have a more solid understanding of gender theory, but will also better grasp race and ethnicity

when I introduce these ideas to the class. Most of the conversation about gender as a spectrum occurs without technological examples, because I simply have not identified technologies that exemplify this idea. This has led me to the conclusion that that material culture in North America reifies binary notions of gender.

Once students can recognize the co-creation of gender and technology, I use gender as a reference point to discuss similar dynamics with other social categories such as race and ethnicity. Conversations about the construction of phenotype and genotype scaffold from the earlier sex and gender conversations. The question, "is technology racial" doesn't sound so strange to students if they have already observed that technology is gendered. The idea that people perform their class identities and use technology to do this also extends nicely from gendered examples of technology. Gender even informs the way I teach environmental studies, as masculinity and masculine technology easily show exploitation of landscapes that have been categorized as feminine. In these ways I build different ways of analyzing the history of technology from the gender foundation that I laid earlier in the semester.

As a group of scholars SHOT has done an excellent job connecting gender and technology. Because of the quality of this work, we are able to use it to expand our analysis of technology into new social areas, helping our students understand broader linkages between technology and society. In the classroom, gender is my favorite tool for many different types of social analysis because it nicely scaffolds other ways of thinking, providing a foundation for studies of technology focused on

race, class or environmental exploitation. Part of this relates to gender theory and my students' conceptions of sex and gender, but the work we have done as a community of scholars to highlight the co-creation of gender and technology has provided me with innumerable examples to help my students understand the world they occupy.

4 thoughts on "Integrating SHOT SIG Concerns into the Teaching of History of Technology: Rethinking Modes of Instruction in a Diverse Communities"

1.  Gabrielle HechtOctober 4, 2013 at 4:24 pm

   Thanks to Anna and Marie for pedagogical inspiration. I confess to being one of those middle-aged people who gets overwhelmed by ICTs, social media, and the like – and my response is often to ignore them altogether rather than spend the time it takes to learn how to use them effectively. Hearing/seeing examples of new pedagogical strategies that can emerge from these techniques gives me a concrete sense of why I would *want* to learn enough to enact these myself (rather than, somewhat embarrassingly, relying on my partner for tech support).

   Two ideas really stood out for me:

   (1) the possibility of creating transnational graduate seminars through virtual connections. I wonder: **Could SHOT offer a node for creating such courses, so that those of us working in different countries (or even different parts of the same country) could plan sessions where our students interact?**

   (2) the idea of an open classroom, including a wordpress blog site where judiciously selected student essays appear. I wonder: **Would it be desirable to have regular hand-on "skills and pedagogy" forums at SHOT meetings, where those who've been successful at implementing these pedagogical project could teach those of us who are still too intimidated to try?**

   On a different note: thanks, Marie, for introducing words like "heteronormative" into SHOT conversations — reading that passage of your post flooded me with relief! There is hope…

   Edit

2.  Marie HicksOctober 7, 2013 at 7:52 pm

   Thanks for your kind comments and very useful insights, Gabrielle. I think a pedagogy skills forum like the one you suggest would be great. In the past, the SIGCIS has done sessions on pedagogy at our Sunday workshop some years, and they always generate a lot of interest and participation.

   Edit

3.  Janet AbbateOctober 7, 2013 at 9:15 pm

   Marie,
   Your comments point up the reflexive position of our SIG: we both analyze and use computer and information technologies, but we don't always know how to integrate those two aspects. Speaking personally as someone who hasn't managed to update her blog in six months (despite having quite a bit to say), I find that such projects are hindered by a lack of institutional rewards and the difficulty of trying to create and maintain a blog (or similar work) as a solo project.

   I'm not sure what the answer to this is, but I think it would have to involve creative ideas for using online projects to *replace* or *reduce* some of the work we currently do offline. We can't simply tell people that they now have to add online projects to their existing workload (which is the message many of us hear). So, I would be interested in hearing ideas for using new technology that are not only innovative and exciting for our students, but also help us faculty with work-life balance. For example, we might use blogs to collaborate across campuses on things like course design.

   Thanks for getting this conversation started!

   Janet

   Edit

4.  Pam EdwardsOctober 9, 2013 at 3:55 pm

   At Geoff's urging I've decided to offer some comments on the posted panel discussion. I did not initially respond because so much of the discussion seemed to deal with upper division undergraduate and graduate education. My situation is a bit different, as a part-time adjunct for two institutions, I teach entry level World History sections. My teaching responsibilities then involve the entire scope of Global History with some geographic and chronological parameters. I do, however, attempt to incorporate issues associated with the History of Technology and the SIG themes discussed above into these courses. In particular, I deal with issues of gender, women, and diversity. For instance, in both my Age of Revolutions and Atlantic World history classes I introduce the idea of the cultural construction of gender and race and then work with the students to apply this to the history of the scientific revolution, race-based slavery and the industrial revolution. We consider how cultural construction might be applied to issues of class and factory production, as well as technology. In the "Atlantic World", we consider female pirates who dressed as men and use this to segue into a discussion of gender and how the tools of clothing, swords, and ships allow these women to change or adjust their individual identity and what that means about identity in the Atlantic World. We also discuss science and technology in the Atlantic World as a community/network that fostered information exchange and consider how gender, race, empire and power politics influenced or shaped these knowledge communities. In looking at the Industrial Revolution with community college students, a Taking Sides reader chapter addressing the question of "Did the Industrial Revolution foster a Sexual Revolution?" allows

students to explore issue of gender, power, community, and new forms of production technology. When dealing with the Industrial Revolution, I often take up theories of innovation, asking students to consider alternatives to the market (necessity) explanations. In the 20th century, among other issues, we consider technology's role in both the World Wars and the institutional/organizational origin of those technologies.

So, I do believe that some topics associated with the History of Technology are present in my undergraduate entry level classrooms. Though this is by necessity somewhat truncated. In particular, History of Technology themes touching on the cultural construction of gender, race and power relations, industrialization and science and technical knowledge formation loom large. Like many of us, I am both a social historians and a historian of technology. I use a variety of techniques to bring these ideas/issues to my students, including exercises with primary sources, basing class discussion on shared readings, putting forward analytical concepts and having the students apply these to specific historical events, individual biographies or production processes. Some work better than others – some spark great interactions one semester and then fall flat the next semester.

Specifically on gender, I think most of my students arrive in class recognizing that gender and sex can be untangled. Even in freshman entry level classes, I do not think this is a completely new concept for most students. I think they may be more challenged by the history of discrimination that theories of cultural construction attempt to analyze – like the idea that constructions of gender may be embedded in a technology and that this cultural construction may have real world implications for women in history, for instance. This surprises me at times, because all the stats tell us that women are still woefully underrepresented in engineering, science and the most technical programs even at the undergraduate level today. To counter this in the classroom, I find it helpful to place the cultural construction of gender alongside the cultural construction of other-abledness and the study of technology, race and ethnicity.

I am interested in this panel discussion because I am always looking for new approaches for incorporating the History of Technology into my classes. I do think that large undergraduate gen-ed sections offer a unique challenge and hope that panel members will keep this in mind. In most cases, I may have less than 10 or 15 minutes to get an idea across before I need to move on and push through the next stage of global history. Having said this, I will be very interested to hear about developments and directions being taken in upper division and graduate level courses. Many of these can be boiled down and reshaped to work with incoming freshmen in survey courses.

Thanks for encouraging participation. Best, Pam Edwards

Edit

Roundtable: “Interdisciplinarity and the History of Technology: Why Diversity Matters”

This roundtable focuses on interdisciplinarity and diversity, on forms of engagement that happen between and beyond the boundaries of conventional academic disciplines as strategies to make visible underrepresented people and topics in new ways. Historians of technology have long since looked to other disciplines to enrich their scholarship. Likewise, an increasing number of them are foregrounding the intersectionality of race, gender, sexuality, and social class in their work. This unconventional session seeks to create a space in which scholars from both areas can think together about how best to more inclusive in a meaningful way.

Each of the participants on this roundtable critically examines the importance of interdisciplinary work as a way to cultivate the idea and experience of diversity in the history of technology. Architectural historian Jennifer Reut’s (American Historical Association) comments on mapping the Green Book, a travel guide for African American automobile travelers, help us to rethink race and the built environment. Her work highlights landscapes as both destinations for travelers shut out of other places and opportunity for economic independence for proprietors and operators of tourist infrastructure. As an academic journal editor and museum curator at the Smithsonian Institution’s National Air and Space Museum, Martin Collins’ thoughts about global mobility call for a critical reexamination of the culture concept, prompting conversation about the problem of interdisciplinary work post-1970s. His reflections provide a refreshing critique of the methodologies and epistemologies needed to imagine and undertake new scholarly pursuits. Historian Phil Tiemeyer’s (Philadelphia University) exploration of flight attendants, gay identity, and notions of proper manhood motivate us to rethink the concept of the modern. His comments cite ways that aviation's legacy as a hallmark of US American predominance in 20th century global affairs coincided with the spread of an Americanesque gay identity into various cultures. An anthropologist and historian, Chandra Bhimull (Colby College) considers the possibilities of creativity and transdisciplinary work as the means and the ends of intellectual activism in the history of technology. Her work on airline travel culture and the black radical imagination in the African diaspora asks us to reimagine where, when, and to whom diversity matters. Cultural historian Anke Ortlepp (University of Munich) reflects on the ways in which the 20th century air travel experience was shaped by notions of race, class, and gender that led to very diverse patterns of use of an initially new transportation technology. Her critical intervention hopes to rethink the boundaries between gender studies, cultural history, and the history of technology.

Together, these scholars will reveal the great potential of interdisciplinary study for the history of technology. Inviting feedback within the format of a non-traditional session they will show that what is at stake for the field is no less than candidly reimagining difference and the politics of knowledge production.

For discussion at SHOT 2013 Annual Meeting session, "Into the Real World: Historians and Public Policy"

How history of technology can create awareness of impediments to technological success and enable historians to win fame and fortune (I wish!) in the worlds of business- and public-policy

Richard Hirsh, Virginia Tech, electricity@vt.edu

When I started out as a historian of technology, I never expected to end up in the business- and public-policy worlds. But in strange ways—often because I took advantages of unexpected opportunities—I learned that I could broaden the impact of my research and "apply" the lessons of history in a novel manner. I also discovered that my policy work sometimes provided new avenues for research that I could profitably explore in the scholarly realm. In these comments, I'll suggest reasons why I think work in our discipline lends itself to real-world applications and how I've been able to move between the academic and policy worlds. More specifically, I'll provide examples of how I applied our craft's tools within the business and public-policy sectors to identify social impediments to technical success.

Without trying to duplicate my essay in *Technology and Culture* t ("Historians of Technology in the Real World: Reflections on the Pursuit of Policy-Oriented History," *Technology and Culture* 52 [Jan. 2011]: 6-20.), let me simply note that our field's emphasis on the social nature of technology has relevance for business- and public-policy practitioners. In particular, historians within our discipline emphasize the importance of the context in which technology evolves. By doing so, we examine many considerations that go into to the creation of technology, such as the role of institutions and culture—the last of which consists of the often unarticulated assumptions, practices, beliefs, and values of stakeholders. As important, we look at the reception within society or among specific publics (such as workers, genders, users, adapters, etc.). Such foci give us an appreciation of the reasons why technology develops in ways that often elude policymakers and analysts, who often think narrowly in terms of economic or political forces. Moreover, historians have developed methodologies to help draw attention to the significance of these considerations. Thomas Hughes's systems approach, for example, underscores the nontechnical circumstances (relating especially to political, regulatory, educational, and financial institutions) that contribute to the creation and maintenance of large-scale technological enterprises. His concepts, such as radical and conservative inventions and momentum, serve as tools that provide a deeper understanding, in a way that has value in the worlds of business- and public policy, of why technologies succeed or fail.

I have found that understanding the creation and reception of technologies within a social context has enabled me to become especially sensitive to impediments to the success of

technologies. In the early 1990s, for example, my book, *Technology and Transformation in the American Electric Utility Industry* (New York: Cambridge University Press, 1989) won the attention of some Pacific Gas and Electric Company managers, who had begun a project to determine how much energy could be saved with state-of-the-art technologies. Hired to write a management history while observing the project as it unfolded, I learned how engineers and architects could collaborate to reduce energy consumption by up to 65% in new structures (compared to those that followed the already stringent California building codes). The success naturally encouraged the PG&E managers, but my historian colleague, Bettye Pruitt, and I remained less exuberant. We cautioned the managers that existing social impediments might constrain the widespread use of these technologies; these included the still rampant use by contractors and builders of rules of thumb (instead of more complicated and time-consuming energy load audits). Nor would financial institutions necessarily recognize the money-saving features of these new buildings, thus denying loans for the sometimes more-expensive structures, even though owners would save money and be able to repay loans more easily. We also observed that approaches for optimally using the technologies would only become accepted slowly because they needed to be taught by informed practitioners in universities (in architecture and building construction departments), in trade schools (for those going into construction and contracting work), and in business schools. But educating the educators would clearly take time. In other words, we stressed the notion that the wonderful hardware would not necessarily find extensive application unless people in key institutions changed their practices. Happily, our client found the report useful, even though it dampened some of the enthusiasm over the project's technical success, and the company made efforts to address some of our concerns. In this case, the focus on institutions that came from work in the history of technology helped us make significant contributions to this real-world project.

That same sensitivity to nontechnical considerations found value in my involvement with analysts and legislators working with the Council of State Governments. Seeking to encourage the use of electric vehicles (EVs), an analyst within the organization discovered a paper written by my colleague, Benjamin Sovacool, and me on possible deterrents to widespread acceptance of the cars. ("Beyond Batteries: An Examination of the Benefits and Barriers to Plug-in Hybrid Electric Vehicles [PHEVs] and a Vehicle-to-Grid (V2G) Transition," *Energy Policy* 37 [March 2009]: 1095-1103.) Drawing on David Kirsch's study of the social impediments to EVs in the early twentieth century (David A. Kirsch, *The Electric Vehicle and the Burden of History* {New Brunswick, N.J., 2000]), we emphasized the lack of support from important stakeholders (such as electric utility companies) and the intense market competition that discouraged the adoption of standards. We also borrowed the historical notion (explored by David Nye in *Consuming Power: A Social History of American Energies* [Cambridge, MA: MIT Press, 1998]) that consumers often remain leery of claims of revolutionary new technologies; instead, people often prefer traditional and familiar (or familiar-looking) technologies,

especially when the new hardware incurs large capital costs or when it relies on not-yet-existing infrastructures (such as charging stations or repair centers). Sensitive to such concerns gained from historical study, I made recommendations to the Council about potentially overcoming social obstacles (such as a piecemeal approach for gaining acceptance of EVs through their use by government agencies, large businesses, universities, and rental car companies). By the way, the paper, "Beyond Batteries," made it to the list of the top-25 most downloaded articles in *Energy Policy* for two years straight. That's not a bad accomplishment for a couple of social scientists!

Finally (for now), let me indicate that involvement in the policy realm demonstrated reciprocal benefits. These benefits accrued, for example, from my service on a committee created by the Virginia Department of Environmental Quality to draft a model ordinance for wind turbine placement near towns around the state. Since I had gained some statewide recognition for work done on the social impediments affecting small-scale "distributed generation" energy systems, such as wind turbines (see my web site for papers on the topic, http://www.history.vt.edu/Hirsh/CERdocuments.html), I was asked to participate. My understanding of wind turbines within a social context proved useful as the committee tried to address hard-to-articulate objections that relied on unusual claims of environmental, medical, and economic harm to nearby residents. That experience made me look more carefully at why some people so strongly objected to wind turbines. Going beyond the understandable technical and NIMBY (not-in-my-backyard) objections, Ben Sovacool and I examined studies performed by landscape scholars, geographers, psychologists, and historians concerning the perceptions of the "natural" environment. As a result of this research, we hypothesized that wind turbines conflict with many people's conception of an electric power system that has remained largely "invisible" and unknown. By contrast, the extremely visible wind turbines (which attract attention because of their size and kinetic components) force people to confront uncomfortable choices that pit a high material standard of living against environmental damage. In short, work in the policy realm paid large dividends in stimulating scholarly work. The result of that effort will appear in a forthcoming *Technology & Culture* article, "Wind Turbines and Invisible Technology: Unarticulated Reasons for Local Opposition to Wind Energy."

To summarize, our field's emphasis on the context of the evolution and reception of technology has enabled me to become involved in the worlds of business- and public-policy. Often, historical work that focuses on the social context of technology's evolution and reception allows me to highlight impediments to the success of recently emerging technologies in ways that engineers, business people, and policymakers do not anticipate. Fortunately, that work in the real world also has given me new ideas and themes to pursue in the academic realm.

Regulating Nanotechnology Via Analogy, Pt. 1

By **Patrick McCray**

[Blogger's note: This post (parts 1 and 2) is adapted from a talk I gave in March 2012 at the annual Business History Conference; it draws on research done by Roger Eardley-Pryor, an almost-finished graduate student I'm advising at UCSB, and me. I'm posting it here with his permission. The original version of this post can be found at http://www.patrickmccray.com/2013/02/12/regulating-nanotechnology-via-analogy-pt-1/ http://www.patrickmccray.com/2013/02/18/regulating-nanotechnology-via-analogy-pt-2/]

Take a Little Risk?

Over the last decade, a range of actors – scientists, policy makers, and activists – have used historical analogies to suggest different ways that risks associated with nanotechnology – especially those concerned with potential environmental implications – might be minimized. Some of these analogies make sense…others, while perhaps effective, are based on a less than ideal reading of history.

Analogies have been used before as tools to evaluate new technologies. In 1965, NASA requested comparisons between the American railroad of the 19th century and the space program. In response, MIT historian Bruce Mazlish wrote a classic article that analyzed the utility and limitations of historical analogies.[1] Analogies, he explained, function as both model and myth. Mythically, they offer meaning and emotional security through an original

archetype of familiar knowledge. Analogies also furnish models for understanding by construing either a structural or a functional relationship. As such, analogies function as devices of anticipation which what today is fashionably called "anticipatory governance."[2]They also can serve as a useful tool for risk experts.[3]

Analogies may serve as a tool for crafting better governance of new technologies

Policy makers recognize the importance of analogies. In 2003, participants at an NSF-sponsored workshop on nanotechnology's societal implications warned that "one of the more disturbing possibilities is that policy makers and leaders of social movements may respond to nanotechnology not as it actually is, but in terms of false analogies."[4] In 2003, policy makers and scientists were especially concerned about the public perceptions of nano.

When the U.S. government first launched its National Nanotechnology Initiative in 2000, few if any policy makers expressed concerns about its environmental implications.[5] But by 2003, it was impossible for the people charged with managing nano to have ignored its environmental, health, and safety issues. So how did EHS issues get on the radar screen of policy makers and journalists? There are several causal factors; their common feature is that they all originated not in the laboratory but in the realms of popular culture, celebrity, and social activism.

An early shot across the bows came from an unexpected source. Bill Joy was a Berkeley-trained computer researcher and dot-com millionaire. His incendiary article – published

by *Wired* in April 2000 – was titled "Why the Future Doesn't Need Us." It highlighted perils he saw in several emerging technologies. Motivated partly by controversies over corporate development of genetically-modified crops, Joy identified self-replication of newly emerging nanotechnologies as a clear and future danger. The solution? Joy proposed "relinquishment" and limiting development of "technologies that are too dangerous." Accompanied by a flurry of international publicity, Joy's article came at an inconvenient time for nano-boosters as Congress was preparing to vote on Clinton's proposed new national nano initiative in 2000. Controversy stirred by articles like Joy's threatened this initiative.

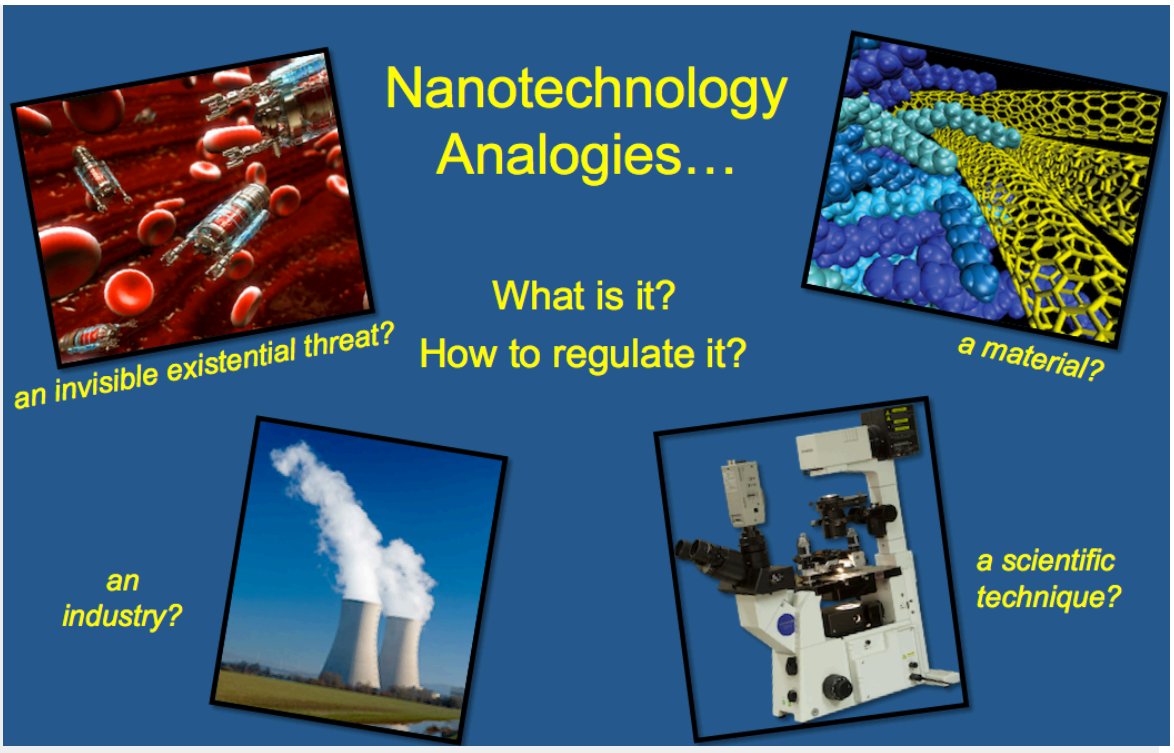
Nano-anxieties were fanned anew in late 2002 when HarperCollins published *Prey* by blockbuster novelist Michael Crichton. Central to its plot was the deliberate release of autonomous, self-replicating nanobots. Created by an amoral corporation working under contract to the Pentagon, the predatory swarm of millions of nanobots attacked people until it was destroyed. Crichton's book hit every button that might stoke public alarm about nanotechnology: a greedy, high-tech firm; lack of government regulation; new technologies turned into military applications.

Non-governmental organizations helped keep controversies over nanotechnology in front of North American and European citizens. In January 2003, the Action Group on Erosion, Technology, and Concentration (ETC), a small Canadian NGO, released a report called *The Big Down*.

ETC had previously led campaigns against genetically modified foods. Not surprisingly, their report savaged the idea of nanotechnology. ETC's report reflected the group's larger agenda, which was less about so-called emerging technologies *per se* and more about restricting corporate power and maintaining cultural diversity and human rights.

But none of the examples was about a specific *existing* technology. Instead, these spurs to regulation referred to *hypothetical* technologies and the creation of planet-threatening dangers. Soon however, concerns about nano's regulation transcended vague existential threats and moved to specific and potentially troubling techniques and materials.

But what exactly was to be regulated? Was nanotechnology something with the capacity to spread across wide swaths of land and reap tremendous environmental damage with the fear amplified in part because of its minute size? Or perhaps nanotechnology was less an existential threat and instead a suite of scientific techniques and tools that require regulation? If not a particular technique, was nanotechnology a particular product, a specific category of material, a hazardous form of matter that should be controlled for the health and safety of workers and consumers? Or, did nanotechnology represent an entire new industry in need of care and control in order to reap its economic benefits?



How you define something helps determine how you regulate it…

So…in order to draw fitting analogies that might suggest an ideal path toward the appropriate oversight or regulation of nanotechnology, stakeholders first had to agree on its definition. And depending on what definition one chose, a different historical analogy could be found which suggested a different approach to regulation…more on this next time. But, to give a hint, the frequent comparisons between nano and genetically-modified organisms were not necessarily the best way to build a regulatory policy.[6]

To be continued…

1. Bruce Mazlish, "Historical Analogy: The Railroad and the Space Program and Their Impact on Society," in*The Railroad and the Space Program: An Exploration in Historical Analogy*, edited by Bruce Mazlish(Cambridge, MA: M.I.T. Press, 1965), pp. 1-52. [↩]
2. Daniel Barben, Erik Fisher, Cynthia Selin, and David H. Guston, "Anticipatory Governance of Nanotechnology," in *The Handbook of Science and Technology Studies*, Third Edition, edited by Edward J. Hackett, Olga Amsterdamska, Michael Lynch, and Judy Wajcman (Cambridge, MA: MIT Press, 2008), 979-1000. [↩]
3. Scott Knowles at Drexel University has a great book out on the role of "disaster experts" in modern America that is worth looking at. [↩]
4. "Workshop Breakout Session Reports," in *Nanotechnology: Societal Implications I, Maximizing Benefits for Humanity*, edited by Mihail C. Roco and William Sims Bainbridge (Dordrecht, The Netherlands: Springer, 2007), 73. [↩]
5. When the National Academies of Science reviewed the NNI in 2002, its report shows that, out of $464 million allocated for nano in FY2001, less than 1% went to the Environmental Protection Agency. NAS, *Small Wonders, Endless Frontiers* report, 2002. [↩]
6. A rhetorically powerful example of this came from 2003 Congressional testimony given by Rice University chemist Vicki Colvin. Colvin, director of Rice's Center for Biological and Environmental Nanotechnology, spoke about societal implications of nanotechnology. This "emerging technology," Colvin said, had a considerable "wow index."Nanotech offered "potential benefits to the economy, human health, and quality of life." However, Colvin warned, every new such emerging technology came with its own particular set of concerns. If improperly handled, these concerns "can turn wow into yuck and ultimately into bankrupt." To drive her point home, Colvin shrewdly drew an analogy between a future in which nano might go bankrupt and an example that would resonate with policy makers – the "genetically modified foods industry." A quick web search on "Vicki Colvin + wow to yuck" yields some 360,000 hits including several presentations and papers she and her Rice colleagues gave that use the phrase. Her original testimony appears in House of Representatives Committee on Science, "The Societal Implications of Nanotechnology," Hearing before the Committee on Science, House of Representatives (108th Congress, 1st Session), April 9, 2003. [↩]

This entry was posted in **Historical analogies** and tagged **Analogies**, **Bill Joy**, **ETC Group**, **Nanotechnology**,**Prey**, **Regulation**, **Vicki Colvin**. Bookmark the **permalink**.

Regulating Nanotechnology Via Analogy, Pt. 2

by **Patrick McCray**

Can historical analogies help us approach technological risks better?

In my last post, I discussed the ways in which policy makers could use historical analogies as tools when considering ways in which nanotechnologies might be regulated. At the end, I suggested that multiple definitions for nanotechnology posed a challenge for finding the one best analogy, however. So – what are examples of the analogies made between nanotech and other technologies and what does have to say about possible regulation paths…consider the following examples:

Example #1 – Genetically Modified Organisms

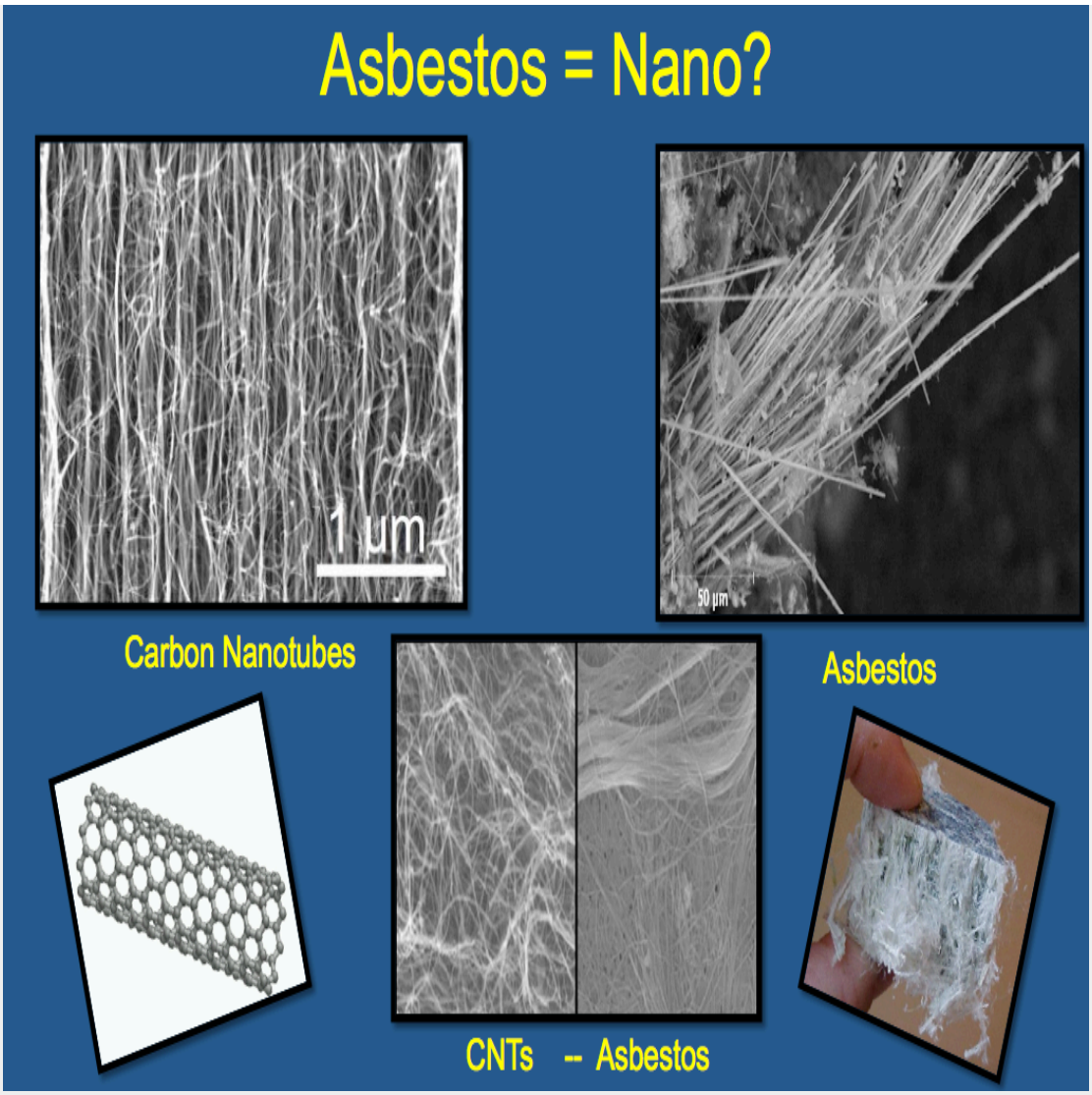
Engineered nanomaterials bear some relation to GMOs...but it's not necessarily a strong one.

In April 2003, Prof. Vicki Colvin testified before Congress. A chemist at Rice University, Colvin also directed that school's Center for Biological and Environmental Nanotechnology. This "emerging technology," Colvin said, had a considerable "wow index."[1] However, Colvin warned, every promising new technology came with concerns that could drive it from "wow into yuck and ultimately into bankrupt." To make her point, Colvin compared nanotech to recent experiences researchers and industry had experienced with genetically modified organisms. Colvin's analogy – "wow to yuck" – made an effective sound bite. But it also conflated two very different histories of two specific emerging technologies.

While some lessons from GMOs are appropriate for controlling the development of nanotechnology, the analogy doesn't prove watertight. Unlike GMOs, nanotechnology does not always involve biological materials. And genetic engineering in general, never enjoyed any sort of unalloyed "wow" period. There was "yuck" from the outset. Criticism accompanied GMOs from the very start. Furthermore, giant agribusiness firms prospered handsomely even after the public's widespread negative reactions to their products. Lastly, living organisms – especially those associated with food – *designed* for broad release into the environment were almost guaranteed to generate concerns and protests.[2]Rhetorically, the

GMO analogy was powerful…but a deeper analysis clearly suggests there were more differences than similarities.

Example #2 – Asbestos



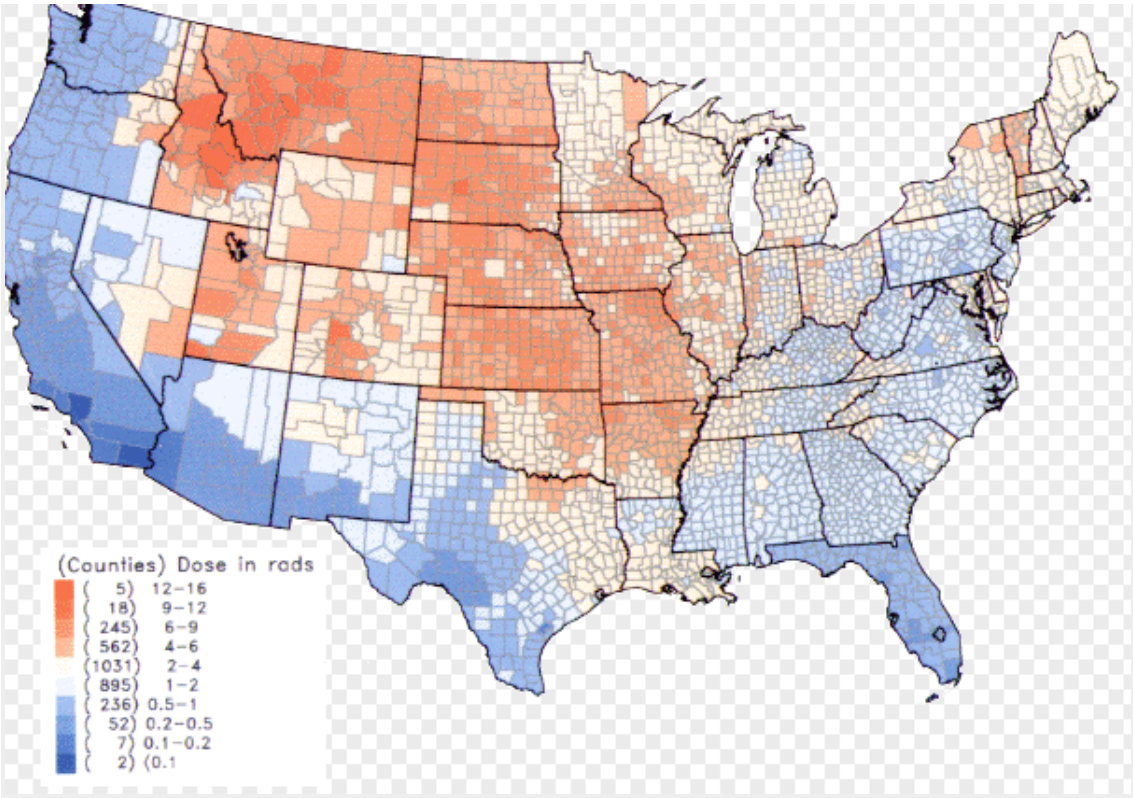
Are engineered nanoparticles analogous to asbestos fibers?

A different definition of nanotech treats it like a new form of matter…stuff requiring special oversight, particularly in the workplace. Such a material definition of nanotechnology suggests a ready analogy to asbestos. Given decades of enormous and expensive asbestos litigation, the analogies between asbestos and nanotechnology have prompted substantial toxicological analysis on new materials.[3] Carbon nanotubes (CNTs) are best known of these new nano-materials. With a long thin structure that resembles that of asbestos, numerous

toxicological studies indicate that nanotubes share a similar toxicity. These similarities and the historical circumstances of attempts to regulate asbestos in the United States offer suggestions for how to proceed toward the regulation of certain nanotechnologies.

Given the known threats of asbestos, the U.S. EPA attempted an all-out ban on its manufacture and use. However, in 1991, the U.S. Fifth Court of Appeals claimed EPA did not meet the requirements to impose the "least burdensome" controls. The court promptly lifted the ban for all but the most dangerous existing asbestos products. The inability of EPA to ban asbestos, despite decades of evidence confirming its hazards, indicates the need for serious reform of Toxic Substances Control Act or TOSCA, the existent United States' law for chemical regulation.[4] While this need for reform applies for existing substances like asbestos, it applies even more so for novel and analogous nanotechnologies like CNTs.

Example #3 Fallout



Per capita thyroid doses in the continental United States resulting to atmospheric nuclear tests at the Nevada Test Site from 1951-1962.

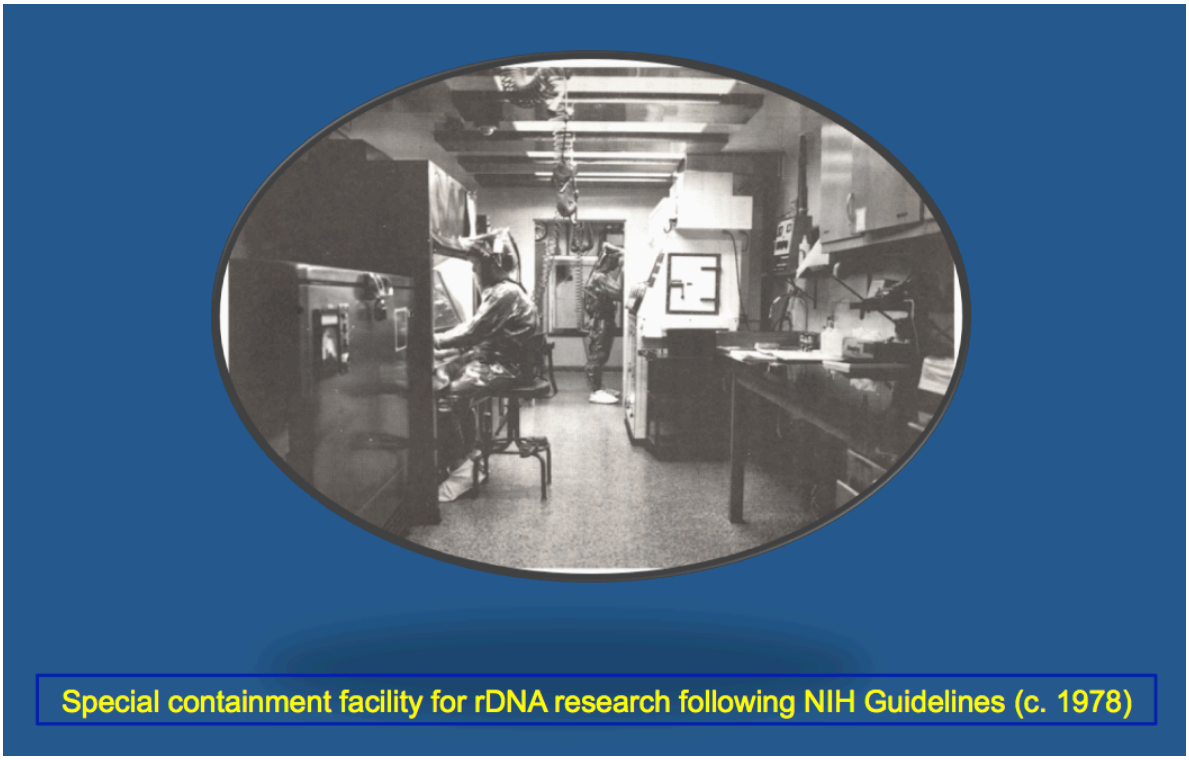
With planetary fears about grey goo and self-replicating nanobots, figures like Michael Crichton, Bill Joy, Prince Charles, and, at times, even K. Eric Drexler, seemed to define

nanotechnology as so broad, diverse, and nebulous that they rendered it as a questionable, minute, and invisible unknown. This line of thinking suggested nanotechnology might be analogous to another existential and invisible, yet life-threatening technological byproduct – radioactive fallout.

Each of the hundreds of open-air nuclear devices exploded between 1945 and 1980 released minute, invisible, radioactive debris that circulated around the planet's stratosphere before falling back to earth, exposing humans and the environment to its harmful radioactivity.[5] The global spread of these materials throughout ecosystems and into human bodies occurred without full public or private consideration of their risks by policy-makers, by scientists, or by unknowingly exposed publics. In WWII and during the Cold War, the dictates of *national* security instigated the development and open-air testing of nuclear weapons. However, by the end of the Cold War, national security came to be defined increasingly in terms of *economic* security. Along those lines, American scientists and policy-makers in the late 1990s and early 2000s framed the need for the federal development of nanotechnology in the rhetoric of economic national security.

The nanotechnology enterprise has also yielded novel engineered particles that exist only at invisible scales; new particles that have found wide commercial distribution around the world before full public or private consideration of their potential risks to human health, or full consideration of their threats to our environmental security. In 2003, Oregon Congressman David Wu hinted at the analogy between nanotechnology and nuclear fallout by citing a historic example of regulating fallout's novel and invisible threat via the Partial Nuclear Test Ban Treaty.[6] Though Representative Wu celebrated the Test Ban Treaty for its international cooperation and control of hazardous fallout, he noted that "In many respects, the Nuclear Test Ban Treaty is nothing but a ban on experimentation."[7] At the time, organizations like ETC, Greenpeace, and Friends of the Earth-Australia had also called for a ban on nanotechnology production until researchers clearly understood all of nanotechnology's EHS risks. As with other examples, one's definition of nanotechnology – here as an invisible, existential, and global threat – determined the appropriate analogy to prior technologies. That definition, in turn, indicated to various nano-stakeholders particular forms of precaution, regulation, and control. If nanotechnology was analogous to fallout, maybe the analogous regulation would be an outright ban that would forestall all future risks?

Example #4 – Recombinant DNA



A fourth definition for nanotechnology moves us beyond consideration of novel forms of matter and instead identifies nanotechnology as a suite of technological practices for manipulating nature – techniques that render the natural world as unnatural. This identification of nanotechnology with particular lab practices yields an analogy to debate about recombinant DNA (rDNA) techniques of the 1970s.

In the mid-1970s, scientists agreed to a moratorium on rDNA practices until they better understood the technology and until the U.S. National Institutes of Health (NIH) could establish proper guidelines. After the famous 1975 Asilomar Conference, the NIH's Recombinant DNA Advisory Committee produced its research guidelines. These guidelines clearly defined specific biological techniques and instituted multiple layers for control, including requirement of biological containments. This ensemble of lab practices helped stimulate the rapid commercialization of modern biotech research and, one could argue, consumer acceptance.

Nanotechnology-stakeholders have identified a similar goal of early anticipation and mutually agreeable control through their framework of anticipatory governance. For some nanotech stakeholders – particularly entrepreneurs affiliated with commercialized industry – the NIH's decision to institute *guidelines* for rDNA technology, rather than push for legally binding *regulations*, offers possible paths for the eventual oversight of nanotechnology.

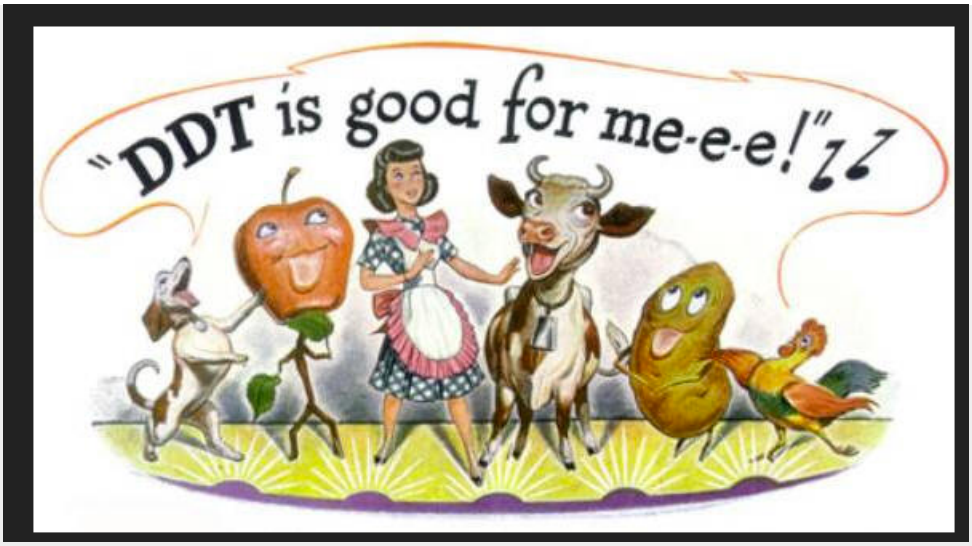
Government guidelines consist of procedures that people are expected to follow when receiving federal dollars, whereas regulations are substantive rules for all actors that carry the authority of law. However, drawing lessons from rDNA and applying them to nano comes with drawbacks –for example, guidelines similar to those from the NIH might only apply to federally funded research. This would leave privately funded research in a different regulatory regime, subject not merely to guidelines, only to the hard law of regulation.

Some concluding thoughts…

"Nanotechnology" is a socially constructed collection of techno-scientific ideas, practices, and materials. But with such a broad and sometimes vague set of definitions for nanotechnology used by scientists, policy-makers, activists, and businesses, how can nano-stakeholders know *what* to regulate?

Some scholars, including Andrew Maynard, a leading expert on risk science, suggest that regulators' wish for strict definitions is misplaced. Maynard, for instance, believes that a precise definition for nanotechnology would actually *impede* proper regulation.[8] Instead of a categorical definition, Maynard now argues that regulation must focus on its various "trigger points," or empirical points that transition a material from conventional to risky. Here, one could imagine officials looking to historical examples to find other such 'tipping points' which catalyzed regulatory reform.

But policy makers have moved in the opposite direction. In late 2011, Health Canada as well as the European Commission announced a specific set of politically designed definitions for nanomaterials to be used explicitly "for all regulatory purposes." Similarly, the United States' most recent research strategy for environmental, health, and safety emphasized the need for federal agencies to establish agreed-upon definitions for nanomaterials. But, even as regulators moved toward a "one size fits all model", analogies with other materials, techniques, and industries still prove useful. The US EPA, for instance, has considered whether certain materials should be regulated under rules that apply to*insecticides*. So, perhaps we can look forward to the drawing of new analogies, not to GMOs and asbestos and fallout but to DDT…



Advert for DDT, c. 1947

So — If historical analogies teach can teach us anything about the potential regulation of nano and other emerging technologies, they indicate the need to take a little risk in forming socially and politically constructed definitions of nano. These definitions should be based not just on science but rather mirror the complex and messy realm of research, policy, and application. No single analogy fits all cases but an ensemble of several (properly chosen, of course) can suggest possible regulatory options.

1. House of Representatives Committee on Science, "The Societal Implications of Nanotechnology," Hearing before the Committee on Science, House of Representatives (108th Congress, 1st Session), April 9, 2003, p. 49. A quick web search on "Vicki Colvin + wow to yuck" yields some 360,000 hits including several presentations and papers she and her Rice colleagues gave that use the phrase. [↩]
2. Ronald Sandler, "The GMO-Nanotech (Dis)Analogy?," *Bulletin of Science, Technology, and Society* 26:1 (2006): 57-62; Arie Rip, "Folk Theories of Nanotechnologists," *Science as Culture,* 2006, 15, 4: 349-65. [↩]
3. A good article on this is Geoffrey Tweedale and Jock McCulloch, "Chrysophiles versus Chrysophobes: The White Asbestos Controversy, 1950s–2004," *Isis* , Vol. 95, No. 2 (June 2004), pp. 239-259. [↩]
4. Marc Landry, "EPA and Nanotechnology: The Need for a Grand Bargain?," in *Governing Uncertainty: Environmental Regulation in the Age of Nanotechnology*, edited by Christopher Bosso (Washington, DC: RFF Press, 2010), pp. 87. [↩]
5. Harold L. Beck and Burton G. Bennett, "Historical Overview of Atmospheric Nuclear Weapons Testing and Estimates of Fallout in the Continental United States," *Health Physics* 82:5 (May 2002): 591-608. [↩]
6. This treaty, signed in 1963 by the United States, the Soviet Union, and Great Britain after years of international negotiation, banned nuclear test explosions in the air, above the atmosphere, or at sea. [↩]

7. House of Representatives Committee on Science, "The Societal Implications of Nanotechnology," Hearing before the Committee on Science, House of Representatives (108th Congress, 1st Session), April 9, 2003: Wu, pg 91. [↩]
8. Andrew Maynard, "Don't Define Nanomaterials," *Nature* 475 (7 July 2011): 31. [↩]

The Use and Abuse of Historical Analogs

By Roger Launius

(Please note: This is a copy of a posting that originally appeared on Roger Launius's blog. We are reproducing it here with his approval. You can see the original post and the rest of Roger's blog here: http://launiusr.wordpress.com/2012/05/01/the-use-and-abuse-of-historical-analogs/)

As an example of analogy from 2003, would Iraq be more like Vietnam or World War II?

There is a long history of the use and abuse of historical analogs, comparisons of different incidents in history to presumably learn from the past. Analogs do offer useful perspectives that may be applied to current challenges, of course, but there are also many instances of poorly understood analysis based on analogy.

The most successful analog studies use approaches developed in Richard E. Neustadt and Ernest R. May's classic text, *Thinking in Time: The Uses of History for Decision Makers* (1986). The methods employed were the fruit of several years' worth of classes taught by the authors at Harvard University. They offered a structure that called for analysis of each analog along three dimensions: (1) What are the similarities with the present situation? (2) What are the differences? (3) What are the implications of these similarities and differences? This framework can be productive in analyzing innovation and strategic surprise.

Political scientist Francis Gavin has refined this approach, offered here, laying out five key concepts that promise more effective historical analysis and their application to current situations. These include understanding and investigating the applicability of (1) vertical history, (2) horizontal history, (3) chronological proportionality, (4) unintended consequences, and (5) policy insignificance. Gavin says:

- Vertical history focuses on understanding why events occurred in the past. This is a very standard task of historical investigation and the best work published in the field all effectively present the whys of history and not just the hows.

- Horizontal history explores the linkage of events across space, either geographical or cultural or economic or political, etc.
- Chronological proportionality emphasizes the long term consequences of events; as an example understanding and applying which scraps of history concerning the Spanish experience in America that will be helpful in analog to the issue of space colonization. Instances universally hailed as significant may prove over time to be less important that initially thought.
- Unintended consequences presents the challenge of applying an analog seen as useful but in reality turns out to be a negative in the long run, or vice versa.
- Policy insignificance is the challenge of applying analogies without full appreciation that the analogs may be less useful than envisioned in the policy making process.

These ideas, coupled with formal analog studies and historical perspectives from Neustadt and May, offer key methodological perspectives on any analog relating to both the past and the present.

Of course, this discussion suggests that historical analogies have an appropriate and an inappropriate use. Too often, advocates deploy analogies that support their basic position. For instance, as the U.S. embarked on an invasion of Iraq in 2003 advocates and opponents alike used dueling analogies to predict the future. Would it become like Vietnam, or would it be like western Europe in World War II? Would the United States become mired in a quagmire or be greeted as liberators? Depending on the perspective, one could argue either analogy. As it turned out, and I believe few would disagree, Iraq proved a quagmire. It was more like Vietnam than World War II, but the linkages were never direct and easily understood. Even without the political gamesmanship that was so much a part of this particular example, it is not an easy task in applying analogs to current situations.

Explicit use of historical tools can benefit person and organization by assisting in effective decision-making. Argument based on fact is convincing, and I wish there were more of it in all of civilization. Argument based on historical data or analogy can be overwhelming, but only if used effectively.

Comments_intotherealworld

John KrigeSeptember 28, 2013 at 4:35 am

Why do historians of science and technology have to buy into the nonsensical idea that we are not part of the ‘real world’ and –worse still – that ‘public policy’ is! The ‘real word’, whatever that is, is obviously a construction mobilized by certain interest groups to promote a specific view of what reality is. It is often used in a typically anti-intellectual way against academia as such.

Academia is a privileged world, but so is banking –the latter far more so — but why should bankers be said to live in the real world and academics not? If anyone lives in a bubble it is they!

And public policy? What could be more ridiculous than to believe that ‘public policy’ has more social impact than history does? Jessica Wang gave a marvelous talk at HSS on just how irrelevant think-tanks and foreign policy advisers have been to the pursuit of US warmaking in Vietnam and Iraq..

Academics should stop reinforcing prejudices against what we do by implying that we are not of this world. Our role is to protect a space that is shrinking by the day, a space of critical detachment from prevailing taken for granted ‘truths’, including truths about ‘the real world’. And instead of fetishizing policy, historians of science and technology should be building bridges to other intellectual disciplines who share our ambitions.

Materiality Roundtable

Martin Collins/Smithsonian Institution

"What does history of technology seek to explain?"

Materiality as analytic focus/methodological problem provokes this question in a particularly useful way. In the modern context, in its conceptual extent, materiality, of course, overlaps with technology. But (I think it is safe to suggest) of these two concepts, materiality has been more fundamentally entangled with the intellectual development of the humanities since 1970—its successive turns and their associated explanatory projects and emphases. My concern here is to probe the more recent preoccupation with materiality and its potential meanings for history of technology.

What kind of intellectual undertaking is it to focus on materiality? And, more specifically, what has such a focus meant in current scholarship, especially re historical framing and explanation? It is useful to situate this turn historically—it is primarily a phenomenon circa post 1990. It draws significantly on Latour's sociology—in which the material is fundamental to a recalibration of our understanding about the social—what it is, who and what participate in it, how it gets constituted, how it changes, and, as a core problematic, to understand how micro and macro phenomena/activities are related. But materiality is bound up, too, with the rise of cultural studies in the 1980s. One can see the confluence of these streams in the founding in 1996 of the *Journal of Material Culture*. Its specific objective was to do this very thing—to take material culture as a scholarly space for critiquing and integrating the disciplinary/methodological ferment in the academy. Interestingly, its aspirations did ***not*** embrace materiality as unifying explanatory analytic. In that positioning, one can see that the Latourian and cultural methods were not fully aligned—a difference still manifest in Latour's *Reassembling the Social* (2007), in which "ideology", "values", and "culture" do not merit entries in the index (although the latter term is engaged, critically, in multiple places in the text).

As a tentative offering, I would suggest that there has emerged more recently a small body of literature which takes a stronger stand as to materiality's intellectual heft: that is, to take it as a prominent organizing and explanatory analytic ***and*** to do so via an accommodation between Latourian and cultural perspectives (primarily by taking contingency, change, and stability as historical rather than philosophical markers). This move has set the stage for broad, multi-layered historical explanations in which materiality provides the critical means to provide re-interpretations of the largest historical categories: modernity, capitalism, the nation state, the transnational, or problems of periodization. As this suggests, the aims of and interest in materially-centered inquiry extends well beyond but includes history of technology. A sampling of three works perhaps indicates this spectrum of interest: Maiken Umbach's *German Cities and Bourgeois Modernism, 1890-1924* (2009); Chandra Mukerji's *Impossible Engineering: Technology and Territoriality on the Canal du Midi* (2009); and Adelheid Voskuhl's *Androids in the Enlightenment: Mechanics, Artisans, and Cultures of the Self* (2013).

For this abstract, I will let those cites linger in the background. But what may be at stake for history of technology in the material turn and in such works? Perhaps this might be considered along two vectors.

One concerns that pesky notion of the material as agent, in which, a la Latour, the material participates in the articulation of the social, helping to create categories such as person, machine, immaterial, and,

not least, the material itself. But yet, these works I offer in passing, by and large, are narratives of coherence, of seeing the material as enabling and aligning with human intentionality and, thus, are intimately bound up with culture—as category and *historical ontology*. Or said differently, these accounts take seriously the material as actor in assembling a historical order, but the material serves primarily (though not always) as a source of stability and continuity for particular modes of culture, a moderation of if not an inversion of the Latourian motif of constant and temporally radical assembling and reassembling.

It seems, also, that a focus on materiality shifts the register of history of technology in not insignificant ways—to broaden the ambition of inquiry to larger orders of historical experience. Thus, the historical task of framing an account, of ferreting out significance and causation, requires a rather higher level of disciplinary self-reflection. In short, it decenters history of technology as discipline, making more urgent the task of clarifying the field's owns explanatory objectives and its relation to history writ large. The authors cited exemplify this point, in which materiality as domain of inquiry rather than home discipline as such organizes their intellectual interests.

Not least, of course, materiality is taken (but not always clearly so) as more encompassing in its ambit than technology or objects/things (a body of literature nearly contemporaneous in its development with that of materiality). The distinction, such as it can be made, reflects a difference in explanatory scale and purpose as well as in the relevant "archive" for such research—those expressions of materiality that speak to the spatial and temporal ordering of experience (e.g, architectural interiors, cityscapes, and large-scale infrastructure, or networks of various kinds).

My introductory question was a provocation to think more deeply about the meaning and import of the material turn. At root, it is a question of our own intellectual history—of history of technology's relation to allied fields in history and the humanities, a conversation that has been underway for 40 years. But I would suggest that the material turn, more than other turns, puts an exclamation point on this decades-long exercise as to how we conceptualize the field's boundaries and its explanatory interests.

Environmental History, the History of Technology, and Materiality

Sara B. Pritchard
Cornell University

Environmental history and the history of technology share a strong interest in materiality. However, in this short essay, I want to argue that environmental history pushes on the definition and aims of the "material" within the history of technology in important ways.

Since this thought piece and the eventual roundtable of which it is a part is oriented to a history of technology audience, I want first to briefly discuss the material within environmental history—making, of course, the usual caveat that these generalizations deserve more discussion and nuance than I can provide here.

Materiality and the material are critical to the field of environmental history and its development (at least in the United States since the 1970s) in several ways. For one, the material has had a significant, perhaps even distinctive, place in the specialty from its earliest years and according to some of its founders. In other words, the material is vital to what environmental history *is*.[1] Consider, for instance, Donald Worster's description of sweeping changes within the historical discipline in his 1988 essay, "Doing Environmental History." As Worster explained, social historians "tried to reconceive history 'from the bottom up.' Down, down we must go, they maintained, down to the hidden layers of class, gender, race, and caste. There we will find what truly has shaped the surface layer of politics. Now enter still another group of reformers, the environmental historians, who insist that we have got to go still deeper yet, down to the earth itself as an agent and presence in history. Here we will discover even more fundamental forces at work over time." Worster then created a taxonomy of environmental histories: materially based studies focused on "nature itself" but including "both organic and inorganic aspects of nature, and not least the human organism," "socioeconomic" studies that explore how these dynamics interact with the environment, and "the purely mental or intellectual." Worster acknowledged that "though for the purposes of clarification, we may try to distinguish between these three levels of environmental study, in fact they constitute a single dynamic inquiry in which nature, social and economic organization, and thought and desire are treated as one whole."[2]

Worster was not alone in paying attention to materiality. Consider William Cronon's groundbreaking (so to speak) *Changes in the Land*, published in 1983. Although, in practice, Cronon beautifully integrated the cultural and the material in his study (say, shifting conceptions of property and environmental change in New England), the title of his book is telling. After all, it is not titled *Changes in the Mind about the Land*.[3] In addition, as Douglas Sackman recently noted, whether one does "material" or "cultural" environmental history is one of the first (and broadest) ways in which the field can be sorted.[4] Overall, environmental history has had a longstanding materialist orientation, and some scholars have actively defended it, especially given the cultural turn within many humanistic disciplines, including history.[5]

Yet, despite this established materialist inclination (or perhaps because of it?), it is striking to me how often the material is essentially presumed within environmental histories and how rarely it is rigorously defined.[6] Moreover, it is significant how consistently the material is taken as a synonym for the natural and basically used interchangeably with "natural" or "environmental."[7] Thus, "material" processes or change refer, for example, to soil erosion rates, shifts in species composition, accelerated hydraulic flows, and (more recently) physical changes

in the human body. This slippage—"material" *as* "natural"—particularly contrasts with assumptions in the history of technology.

Of note, none of these analytic moves or patterns is either unproblematic or uncontested, although I do not have space to discuss those critiques here.[8] However, these points about materiality within environmental history (painted in admittedly broad brushstrokes) help bring three trends within the history of technology into sharper relief.

First, perhaps not surprisingly, the "material" within the history of technology usually refers to technologies or the physical properties and qualities of technological things. Thus, although scholars in both fields are committed to materiality, each generally focuses on a *different* materiality—the natural within environmental history and the technological within the history of technology—with the focal point of one field remaining more in the background of the other. Consequently, environmental historians and historians of technology make opposite yet parallel and often fruitful moves, along with their attendant oversights and omissions.[9]

Second, insights from environmental history suggest that the "natural" version of materiality is relevant in all stages in the life cycle of a given technology. As we know, historians of technology have shifted their analyses over the past generation of scholarship, moving from largely top-down studies focused on technical and political elites to include workers, mediators, users, and consumers.[10] We now think of technologies in terms of their design, development, production, and use, thereby widening our definition of what technology is and of who counts as a technological actor.

But what about the very beginning and end of a given technology, including their material dimensions? What about the raw materials—so-called natural resources—from which technological things are literally made? What about the energy necessary for building (and eventually operating) technological objects and systems?[11] Or the ecosystems on which technologies still rely—dependencies that ultimately complicate the boundaries between natural and technological entities?[12] Certainly, some conventional narratives such as those told about the British industrial revolution emphasize the critical role of coal, and Christopher Jones has recently proposed the idea of "energy landscapes" with respect to American industrialization.[13] But I would maintain that teasing out the nature of technology, especially as a mode of analysis for *all* technologies, is uneven at best and arguably largely absent.[14] I am certainly not advocating an environmental determinist understanding of technology and why its material qualities are the way that they are. For instance, Joy Parr's study of Canadian women and why they adopted the automatic washer much later than American women shows that it was not just the availability of water resources, but also Canadian women's perception of appropriate water use that help explain the differential adoption rates.[15] Such studies illustrate the insights gained from *integrating* technology-culture entanglements from the history of technology with nature-culture entanglements from environmental history, resulting in a more complicated (and admittedly, more cumbersome) triad of nature-culture-technology.

And what about the "end" of a given technology? Scholars working at the intersection of technology studies and the emerging field of discard studies have compellingly studied later stages of technology, showing, in fact, that technical objects often have complicated, multifaceted lives long after they have been used for their original intent.[16] Their material characteristics are part of what makes these stories not just interesting but important. For example, Djahane Salehabadi's work on the global flows of electrical and electronic waste ("e-waste") originating in Berlin underscores how components made with certain minerals can be both valued commodities, and hence economic opportunities, as well as serious environmental

and human health threats. The material properties of these technological objects (including their constituent parts) help explain who wants them (or not), where they go (and where they do not go), what is done to and with them, and why. As Salehabadi shows, "the material" is therefore far less stable and monolithic than the term may suggest at first glance.[17] In a second example, Finn Arne Jørgensen has traced how modern technologies of food distribution, such as glass bottles and aluminum cans, combined with late twentieth-century environmentalism, resulted in the development of new technological systems of recycling.[18] Certainly, we can analyze such systems in good Hughesian fashion.[19] Yet thinking about the "afterlives" of bottles and how people responded to and dealt with these material objects brings to the fore fresh questions and concerns, such as widening the temporal bookends of our narratives about, say, everyday consumer technologies to study the disposal of these technologies, as much as their design, production, or use.[20] Technological afterlives—although the term problematically reinforces a singular, initial purpose or use for a given technology—therefore merit their own inquiry, which is in part due to their physical qualities: glass bottles that end up on the roadside and do not decompose, or minerals extracted from circuit boards that can be sold or, when inhaled, can cause serious health problems.

Third, perspectives from environmental history suggest that many historians of technology remain uncomfortable attributing patterns of technological development and change to "natural" factors and processes. Put provocatively, explaining the *techno*-material by the *enviro*-material seems to smack of technological determinism. Indeed, Wiebe Bijker has referred to the "haunting ghost" of technological determinism within the history of technology and the Society for the History of Technology specifically.[21] Admittedly, "nature's agency" can be problematically reified within environmental history.[22] At times, some environmental historians have disentangled nature-culture processes to maintain the idea of nature's agency.[23] Despite these issues, there is something fundamentally important about what environmental history aims to do here: its insistence that technology not only shapes but is also *shaped by* the natural world. Again, this premise does not require subscribing to a form of environmental determinism. Rather, it can foster a more complicated entanglement and theorization of natural-cultural-technological processes that mutually shape one another. These trends are already represented in the shift to coproduction and growing work at the intersection of environmental history and the history of technology, but such frameworks could be developed and mobilized even more.

I want to end, then, with five purposefully provocative, interrelated propositions that hopefully emerge from my discussion above and might spark further conversation:

1. Many historians of technology are not actually taking the material seriously enough.
2. The history of technology generally adopts a particular definition of materiality that tends to privilege the technological.
3. Historians of technology need to consider more seriously what I will inelegantly call the enviro-material.
4. Thinking about materialit*ies*, rather than materiality in the singular, might open up new analytic possibilities and insights.
5. It's time to put the haunting ghost of technological determinism to bed and embrace more complex accounts of technological development and change that leave room for multiple materialities as not only objects of study, but also explanatory tools.

I would like to thank Gabrielle Hecht (and others) for initiating these "big picture" conversations about the history of technology and SHOT, Bruce Seely for inviting me to participate in the roundtable, and Vivian Y. Choi and Rachel Prentice for reading an earlier draft of this essay. Ongoing conversations with Djahane Salehabadi have also shaped my thinking on many of these issues.

[1] Environmental historians whose methodologies are rooted primarily in cultural and intellectual history would undoubtedly disagree with the argument that a materialist approach defines and distinguishes environmental history.

[2] Donald Worster, "Appendix: Doing Environmental History," in *The Ends of the Earth: Perspectives on Modern Environmental History*, ed. Donald Worster (New York: Cambridge University Press, 1988). It is worth noting that Worster's essay was published when environmental history in the United States was still a relatively new specialty; for instance, the American Society for Environmental History was founded in 1977. Professionalization and institutionalization within the United States ignores, however, precedents as well as influences from related fields. For conflicts over what environmental history "is" around the time of Worster's essay, see "Environmental History: A Round Table," *Journal of American History* (March 1990): 1087-1147. In addition, much of the rest of Worster's essay (and some of his other scholarship) is strongly influenced by Marxist theory. Thus, there are larger questions here about the role of Marxist and neo-Marxist analyses in shaping Worster's materialist understanding of environmental history. Of necessity, I must set aside these enormous (and important) questions about how the "material," "materialist," and "materiality" connect to influential strands of social theory such as Marx.

[3] William Cronon, *Changes in the Land: Indians, Colonists, and the Ecology of New England* (New York: Hill and Wang, 1983). Contrast, for instance, Cronon's book with Roderick Nash's *Wilderness and the American Mind* (New Haven, CT: Yale University Press, 1967).

[4] As Douglas Sackman succinctly explains, "a central analytical tension" has characterized the field of environmental history: namely, some environmental historians focus on the "so-called material dimensions of history," while others "have looked primarily at changing ideas about the natural world." As he puts it, "there is clearly a need for both kinds of histories, as well as for studies that show the interrelationship between the material and the ideological on all levels." See his "Introduction," in *A Companion to American Environmental History*, ed. Douglas Cazaux Sackman (Malden, MA: Wiley-Blackwell, 2010): xiii-xxi, quotation from xiv.

[5] J. R. McNeill, "Observations on the Nature and Culture of Environmental History," *History and Theory* 42 (December 2003): 5-43; Ellen Stroud, "Does Nature Always Matter? Following Dirt Through History," *History and Theory* 42 (December 2003): 75-81.

[6] As a full confession, I include myself here: I must admit that I never bothered to look up "material" or "materiality" in the *Oxford English Dictionary* before this roundtable.

[7] Few environmental historians subscribe to an understanding of "nature" or "environment" as being pristine and untouched by human society. Somewhat ironically, then, even when used in this sense, "natural" and "environmental" can reinforce divisions that most environmental historians seek to question.

[8] Briefly, some of these critiques include the marginalization of more cultural- and intellectual-history approaches within environmental history; the ways that discussions of the material and the cultural can reinforce a false dichotomy; and relatedly, empirical and theoretical work that

explores the porous boundaries and complex dynamics between the material and the cultural. On the last two points, see Donna Haraway, Modest_Witness@Second_Millennium.FemaleMan_Meets_OncoMouse: Feminism and Technoscience (New York: Routledge, 1997); Gabrielle Hecht, *The Radiance of France: Nuclear Power and National Identity after World War II* (Cambridge, MA: MIT Press, 1998).

[9] There are good reasons for the fields' tendency to conceive of the material in this way, given their histories (e.g., gaps in previous scholarship that both fields sought to address) and the reality that all fields and subfields must initially work to justify their questions and approaches. Inevitably, however, foregrounding certain arenas in order to bring these areas into focus means that others are backgrounded and inevitably less adequately addressed.

[10] For examples of these shifting trends, see Judith A. McGaw, *Most Wonderful Machine: Mechanization and Social Change in Berkshire Paper Making, 1801–1885* (Princeton, NJ: Princeton University Press, 1987); Carolyn Goldstein, "Home Economics: Meditators," in *Gender and Technology: A Reader*, ed. Nina E. Lerman, Ruth Oldenziel, and Arwen Mohun (Baltimore: Johns Hopkins University Press, 2003); Ronald Kline and Trevor Pinch, "Users as Agents of Technological Change: The Social Construction of the Automobile in the Rural United States," *Technology and Culture* 37 (October 1996): 763-795; Joy Parr, "What Makes Washday Less Blue? Gender, Nation, and Technology Choice in Postwar Canada," *Technology and Culture* 38 (January 1997): 153-186.

[11] Alfred W. Crosby, *Children of the Sun: A History of Humanity's Unappeasable Appetite for Energy* (New York: W.W. Norton, 2006).

[12] Sara B. Pritchard, *Confluence: The Nature of Technology and the Remaking of the Rhône* (Cambridge, MA: Harvard University Press, 2011); Daniel Schneider, *Hybrid Nature: Sewage Treatment and the Contradictions of the Industrial Ecosystem* (Cambridge, MA: MIT Press, 2011).

[13] On China's industrialization and the lack of coal, see Kenneth Pomeranz, *The Great Divergence: China, Europe, and the Making of the Modern World Economy* (Princeton, NJ: Princeton University Press, 2000); Christopher F. Jones, "A Landscape of Energy Abundance: Anthracite Coal Canals and the Roots of American Fossil Fuel Dependence, 1820–1860," *Environmental History* 15 (July 2010): 449-484.

[14] On the "nature of technology," see Andrew C. Isenberg, *Mining California: An Ecological History* (New York: Hill and Wang, 2005); Pritchard, *Confluence*.

[15] See Parr, "What Makes Washday Less Blue?" Of note, Parr demonstrates that Canadian women considered a number of factors such as how much income their families could put towards domestic technologies, and thus they selected individual appliances in light of their entire household economy.

[16] For one accessible overview, see the blog: discardstudies.wordpress.com.

[17] Djahane Salehabadi, "Making and Unmaking E-Waste: Tracing the Global Afterlife of Discarded Digital Technologies in Berlin," (Ph.D. diss., Cornell University, expected January 2014); Djahane Salehabadi, "Transboundary Movements of Discarded Electrical and Electronic Equipment," Solving the E-waste Problem Green Paper, United Nations University, March 25, 2013 (http://www.step-initiative.org/tl_files/step/files/5.%20StEP%20Task%20Forces/5.1%20TF%201%20Policy/5.1.4%20Projects/Transboundary%20Movement%20of%20WEEE/StEP_GP_TBM_20130325.pdf).

[18] Finn Arne Jørgensen, *Making a Green Machine: The Infrastructure of Beverage Container Recycling* (New Brunswick, NJ: Rutgers University Press, 2011); Finn Arne Jørgensen, "The Backbone of Everyday Environmentalism: Cultural Scripting and Technological Systems," in *New Natures: Joining Environmental History with Science and Technology Studies*, ed. Dolly Jørgensen, Finn Arne Jørgensen, and Sara B. Pritchard (Pittsburgh: University of Pittsburgh Press, 2013).
[19] Thomas Parke Hughes, *Networks of Power: Electrification in Western Society, 1880-1930* (Baltimore: Johns Hopkins University Press, 1983).
[20] For an important early study of waste within the history of technology, see Susan Strasser, *Waste and Want: A Social History of Trash* (New York: Metropolitan Books, 1999).
[21] Wiebe E. Bijker, "Globalization and Vulnerability: Challenges and Opportunities for SHOT around Its Fiftieth Anniversary," *Technology and Culture* 50 (July 2009): 600-612, quotation from 610.
[22] For an insightful problematization of both nature's agency and the idea of agency more broadly, see Linda Nash, "The Agency of Nature or the Nature of Agency?" *Environmental History* 10 (January 2005): 67-69.
[23] For a beautiful illustration of entanglement, see Timothy Mitchell, *Rule of Experts: Egypt, Techno-Politics, Modernity* (Berkeley: University of California Press, 2002), especially Ch. 2. For a critique of reducing complex causalities to a single natural agent, see Paul Sutter, Review of J. R. McNeill's *Mosquito Empires: Ecology and War in the Greater Caribbean, 1620–1914*, H-Environment Roundtable Reviews 1 (January 2011): 17-22 (www.h-net.org/~environ/roundtables/env-roundtable-1-1.pdf).

Materiality – Roundtable SHOT

Printing, pots and other propositions

Dagmar Schäfer

Practical experience was part of my education, including training of how to breed the worm, reel the fibre, weave the thread and set up the drawloom. I did this in Hangzhou during my first years of studying abroad. Later in the mid-1990s during my PhD at the Suzhou Research Institute for Silk (now a museum) I became more interested in the loom itself. At that time the idea of re-constituting ancient methods was still new to China and experimental and research-oriented. The drawloom was a replica, the silk from the vicinity, and while all were very conscious of traditional ways, the reeling experts and weaver were partly at a loss how many of excavated silks they knew of could have been produced without modern add-ons and had to work their way through. Material analysis or understanding was not part of my education and more a process of asking one's way through.

There is no shortage of objects in China. Archives have been opened and archaeological excavations bring up new objects by the minute. Textual materials on materiality in China abound too, as Chinese scholar-officials had an inclination to list materials in dispositions for action, state account or lineages of intellectual thought. Identifying and counting materials was inherent to the system. In the historiography of technology in China materiality has played a very ambiguous role: the properties of the material set constraints, explicated local diversity and often also the distinct pathways/directions of social, economic or political developments. Not that this was any different in the broader field. The ambiguity lies in the fact that in the West the history of technology in China was written and researched almost entirely based on texts, at least up until the 1990s. For an analysis of the materials, or artefacts, the analysis of archaeological sites or even the environmental context of a historical situation Western researchers relied (and even nowadays still draws heavily) on reports of Chinese colleagues who could/can access and analyse materials directly and have the advantage of immediate (and occasionally also exclusive) primary source access.

Even though times have changed a bit, the Non-Chinese historian of technology working on China hardly ever comes in direct contact with the materiality' that s/he describes: it is past. Again this is in my view a common issue, and equally true for those who study 19th century factory work. Traceable are the experience and circumstances, and material ingredients at best, but does this mean the materiality was the same?

Otto Sibum has built up a programme on the experimental history of science (borrowing from the notion of 'experimental archaeology'). In a reinstitution of Lichtenbergs elctrophor he needed a special kind of resin. He found one local violin-maker in town to produce the "exact mixture that was used in late 18th century." In relation to another experiment performed by James Joule, Sibum points out that "Since we neither live in the eighteenth century nor can we walk back into an early Victorian laboratory in Manchester, we cannot tell exactly what problems the historical actor may have faced. But our experiences become a great heuristic tool to ask question about past practices." What are then the questions we ask about past materiality? Or does materiality have no past in these experiments?

Another form of the re-instituted and relived past are virtual simulations. Do computer simulations qualify as experiments? (see Wendy Parker, "Does matter really matter? Computer simulations, experiments, and materiality discussion," Synthese 2009:484). If only the real stuff counts, why do we do visualizations on maps, 3-D visual or material reproductions? IF we do such experiments, does this mean we mistake 'relevant similarity' for 'materiality' and does the actual experiment or even the scientific analysis of ancient materials provide *more* -- in the sense of involving sensory experiences, touch, smell and the like? Or do we put too much emphasis on the latter only because of a presentist concern?

Research leads into publication. If research on materiality is using multiple media, than should this not also have implications for our way of publishing our results: if sensory experiences or even the real material matters, shouldn't we then not also publish our results differently and not mainly as books? What role should exhibitions or the artefacts themselves or their visuals play? Linda Hurcombe, archaeologist, recently suggested that "thus, if interdisciplinary studies of material culture and materiality are to progress, they need to address material issues and performance, and the transmission of these concepts also within modern discourse" („A Sense of Materials and Sensory Perception in Concepts of Materiality: World Archaeology, Vol. 39, No. 4, Debates in "World Archaeology" Dec., 2007: 534)

Philology is central to the study of technologies in Asia and herein distinctive and distinctively cultural. Materiality gives our stories continuity and a basis for comparison. Certainly, in Chinese history, archaeologists, art historians and philologists talk with each other, when looking at how the social produces and uses materiality and how the material is witness of the production of the social. Materiality, however, often fades into the background: direct experience of contexts, objects and texts transforms into a form of historiography rooted – like the Song, Ming, Qing literati view – in the study of antiquities by means of philology (how this plays out in one of the core themes of Western scholarship on China Sino-western exchange, see Marco Musillo, "Sino-western Interactions: Materiality and Intellect in the Historiography of China," European History Quarterly 2013/43)
In art history I find that what is talked about is design in the sense of the ideal type [of a ritual vessel, for instance]: "attachment to one specific exemplar has no relevance anymore; one loves the form, not the specific object,"(P. Verbeek& Kockelkoren, "Matter matters" in Eternally Yours: visions of product endurance, 010 Publishers 1997:103). In a talk at the V&A a couple of weeks ago, Christine Guth (Japanese art historian) interestingly pinpointed the role of materiality in Asian arts. She described Japanese artist-artisans historical attempts to produce lacquer ware that look exactly like a ceramic, emphasizing how it is traditionally discussed as a question of function and design. But, as she emphasized, these artisans did not push design at all: In fact what they *pushed* were the materials to the point of taking the function and being like a ceramic. A question we discussed was if this meant that the artist wanted to render the material irrelevant, highlight its variability, the objects function or if eventually it was not in fact the material he was actually concerned about. And in all that did the artisan have the same in mind as the scholar who appreciated the wares and described the artisans effort in a text?

Design is one of the issues that is rendered in Chinese texts in close relation to materials. For the 15th century scholar-literati and minister of rites Qiu Jun an objects' function relied on its material constituent. And as a Chinese PhD student recently noted rather critically, this also determines how ancient artefacts' materiality are discussed: Texts and objects are considered mutually constitutive, and this mutual argumentation creates reliability: the artefact defines the terminology and the terminology identifies the materiality. Materiality is relational, but still texts seem to be a grid along which much of past materiality is ordered and assessed. The exception defines the rule. The durability that materials create in our stories seems to me an important topic.

Just a week ago a colleague historian of Chinese intellectual history mentioned that after yet another talk about "a pot" and the diversity of materials he felt even more at a loss why a history written in terms of materials and materiality should matter to him. He quoted Dilthey who said that being is directly and essentially perceived via the primal experience of resistance – the phenomenon of reality is constituted via the experience of knocking one's head on the door's log: an individuals' perception may vary whereas the reality of the log is undeniable (and quite painful). It might be that one of the tasks of the future is to explain why a study of materiality from the viewpoint of technology history should matter to the philologist, archeologists and art historians after all.

The Materiality of Experience and the History of Technology
Materiality and the History of Technology, President's Roundtable
Darla Thompson, Middlebury College
September 29, 2013

I took this picture of an iron collar on display at the Louisiana State Museum, located in the French Quarter of New Orleans several years ago. Iron collars were used for centuries throughout the Americas to control slaves. What I am interested in discussing is how I understand these technological objects within the context of the histories of technology and U.S. slavery. In particular, I am interested in articulating the material experience of slavery within the context of a broader socio-technical system of control and containment directing slave labor in the service of local and national commodity production and distribution. My interest in materiality is obviously linked to considerations of what it meant for slaves to live and work under grueling conditions amplified by the use of iron collars, particularly those with projecting spikes, hooks, and bells. The use of iron collars by slaveholders for punishment or as part of slaves' criminal sentencing, were an obvious physical and psychological intervention into the slave's body. Iron collars were part of the sensory experience of slavery (Mark Smith, 2001), since they not only caused pain through their weight or obstructions, they served as an extension of the body, prevented sleep, and interfered with physical intimacy. In short, an iron collar locked around the neck or riveted to a body by a blacksmith and worn for months, even years, became an extension of self that visually, physically, and psychologically affected slaves and others who enforced or witnessed their use.

In terms of the materiality of objects, my work was initially influenced by Actor-Network Theory, particularly the scholarship of Bruno Latour and AnneMarie Mol.

Drawing on their scholarship provided me with a language to discuss the enactments of bodies and objects, as slaves experienced being entrapped, confined, modified, and shaped by wearing iron collars. However, obviously, the mobilization of these everyday objects was clearly informed by physical and discursive practices of violence (Foucault, 1977), which problematizes using scholarship that does not directly engage structural power relationships between people. While the use of iron collars by slaveholders and others has received attention in the broader literature on slavery, a focus on them as objects of material culture other than museum exhibition catalogs is rare, other than, works such as Marcus Wood's *Blind Memory: Visual Representations of Slavery in England and America, 1780-1865* (2000), Michael Chaney's *Fugitive Vision: Slave Image and Black Identity in Antebellum Narrative* (2008), and Katz-Hyman and Rice's *The World of a Slave: Encyclopedia of the Material Life of Slaves in the United States* (2010).

While most people may think of the important scholarship of Judith Carney (2001) and Angela Lakwete (2003) when they think of slavery and technology, and a long list of works on labor and technology, what I would like to add to the conversation is thinking about the ways that everyday technological objects like iron collars collapsed distinctions between public and private forms of violent punishment, productivity and unproductivity, and mobility/immobility. To give a brief example, iron collars served slaveholder's as a tool to restrict a slave's mobility with their weight and projections, making it more difficult to move short or long distances and escape visual surveillance. However, iron collars simultaneously functioned as objects of mobile confinement and slave productivity to force labor on plantations and in cities.

Though my thinking about the material experience of slaves is informed by a variety of works and fields of scholarship, reading slave narratives, and viewing iron collars in museums, I still find it challenging to articulate my work in conversation with historical studies of technology. I look forward to discussing this with you further online and at SHOT.

Comments

9 thoughts on “Materiality and the History of Technology”

1.  Laura MeekSeptember 30, 2013 at 3:19 pm

   To complicate Pritchard’s entanglement even more (which I really enjoyed), it might be important to keep in mind that the dualism underlying the nature/culture divide is a particular ontological assumption that may be untenable in some projects, such as Africanist work on materiality. The idea that nature is “deeper” or “below” technology and culture, as she describes it, is a metaphor not applicable to all ways of being in and making worlds.

   Edit

   1.  Sara PritchardOctober 2, 2013 at 7:53 pm

      Laura,
      Thank you for your thoughtful comment. You point to an underlying tension in my essay: in places, I question environmental histories that disentangle nature-culture; but in other places, I end up reinforcing that very division.
      I also very much appreciate your important point here that such categories and binaries are culturally and historically specific. I had an interesting conversation with Julia Adeney Thomas (a historian of Japan at Notre Dame) about envirotech. As she pointed out, envirotechnical analysis only makes sense if the environment and technology are presumed to be separate; she argued such divisions are not prominent in Japan. You are rightly pointing to the ways in which our conceptual tools, as scholars, can be shaped by particular cultural and historical traditions, which then may shape our analyses of various things and places.
      Would you be willing to share citations of Africanist work on materiality? I suspect others reading the blog may be interested as well.
      Best,
      Sara

      Edit

      1.  Joshua GraceOctober 4, 2013 at 2:06 am

         I’ve always found James Giblin’s work on tsetse flies in The Politics of Environmental Control in Northeastern Tanzania a terrific and under-appreciated example of good environmental history – and good history of science as well. You may find Nancy Jacobs’ work on South Africa relevant

too. And the last chapter of Jacob Tropp's Natures of Colonial Change has stuck in my mind as a good way to think through these issues.

Edit

2.  Joshua GraceOctober 4, 2013 at 2:16 am

Darla,

This is a great topic. I'm reminded of Rosalind Shaw's, Memories of the Slave Trade: Ritual and Historical Imagination in Sierra Leone and even Robert Baum's Shrines of the Slave Trade. Donald Wright's oral histories from the Senegambia (published in two volumes) are chalked full of material things – sometimes pertaining to slavery, but other times not (which is also important).

Edit

1.  Darla ThompsonOctober 8, 2013 at 11:34 am

Dear Joshua,

Thank you for your comments. I remember reading Baum's text several years ago, along with Eugenia Herbert's Iron, Gender and Power, and McNaughton's The Mande Blacksmiths. I will look into Shaw's and Wright's work. I wonder if there are parallels to the experience of different forms of confinement (which I study) and the materiality of ritual and belief.

There certainly is a body of scholarship that I did not cite that discusses slavery and material things in the US context (particularly archaeology, and specific material culture studies), but I am curious about work that conceptualizes the materiality of experience and engages the history of technology. I agree that other material things, including those that do not pertain to slavery are important. I will continue to think about scholarship that can provide insight into slaves' experiences of wearing iron collars, laboring on chain gangs, state public works labor, and incarceration in jails and penitentiaries in nineteenth century US!

Thanks again,
Darla

Edit

1.  Dolly JørgensenOctober 9, 2013 at 2:24 pm

Darla,
This is precisely the kind of study that more historians of technology need to get into: Thinking about daily life (and death) and how the seemingly small, insignificant technologies are the most significant of all. It's time to stop looking at the big glamor (and maybe masculine?) technologies (cars, airplanes, computers) and follow your lead in recognising that the mundane is not so mundane after all.

It also is so important to do what you are doing and put the physical body into the equation. How technology has been 'felt' as a sensory experience is under-explored.

Edit

3.  Amy SlatonOctober 9, 2013 at 3:03 pm

I'm excited about Martin's "provocation" here, urging us to consider, reflexively, the relationship between histories of materialities and histories of technologies. The former most definitely "shift the register of history of technology in not insignificant ways—to broaden the ambition of inquiry to larger orders of historical experience," as Martin puts it, and I'd add Ken Alder's work, Tiago Saraiva's, and also Lundy Braun's (which includes raced, bodily materialities) as more examples of this broadening.
I also think that a focus on materiality empowers our historical study of demarcation around technological commitments, by which I mean historical actors' efforts to render their productive projects (whether undertaken in the home, workplace, marketplace, or battlefield; whether artisanal, industrial, or metrological) as legible…as novel, distinct, beneficial, worthy of investment, justifying wage costs, justifying health costs, etc. Those demarcation efforts represent some of the historically efficacious mechanisms for establishing the "solidity and continuity of modes of culture," perhaps, to which Martin points in his abstract. In short, a focus on materialities may help us highlight, rather than recapitulate, the social intentionalities of those we study.

Edit

4.  Bruce SeelyOctober 12, 2013 at 1:08 pm

My thanks to the presenters in this roundtable and the audience of the session –as well as the others who have added posts. This specific topic holds special promise for me since, as Gabrielle noted in opening the discussion, material objects have long been a focus of the work of many of our members. The number of people at this session strikes me as reflecting that deep-seated interest. Moreover, the original posts and the queries and comments accomplish, I believe, the intentions of the various advocates of this extended discussion within SHOT about intellectual directions and activities.

My purpose is to ask that those following this thread of conversation use the SHOT talk vehicle to think about ways in which SHOT as an organization might advance the

conversation. To be sure, much of the impact of this discussion may come at the level of the individual scholar — taking the form of whom we choose to talk to and engage, and who we choose to cite while pursuing our research, teaching and scholarship. I ask that we give thought to what SHOT could do to be supportive here — bearing in mind that SHOT is a volunteer organization so members need to be willing to provide the necessary time and energy required to accomplish any task. The Executive Council and officers hope to see action items emerge from these roundtables. Thanks for helping us by proposing such steps and specific activities.

Edit

5.  Davide OrsiniOctober 13, 2013 at 2:59 am

To build on Bruce's post, I would like to add that the format of the roundtable has really changed the dynamic of the conversation. It reminded me of those wonderful graduate seminars in which the conversation constitutes a creative moment, a collective intellectual effort that has the power to generate thoughts, not just smart remarks. I have a substantive reflection and a concrete proposal for how to continue to carry on this collective effort. On the substance: It seems to me that one of the risks for historians of technology is policing too much their disciplinary boundaries, with the result of excluding themselves from fruitful and long-standing conversations in other disciplines, like anthropology and sociology, among others. To make a concrete example, I was struck by the fact that while the panelists where trying to broaden and deepen the discussion about materiality and history, at some point many comments from the audience seemed to reify those categories that I understood as dead and buried forever: long live technological determinism! So I had to hear once again that on one hand there is the distinction between the intentionality, purpose, and use of human beings, on the other the obduracy of technological artifacts or "nature" which we act or are acted upon. Should we die materialists, determinists, nihilists, Latourian, Kantian–you add what you want–or should we try to get beyond intellectual cockfighting and disciplinary policing and engage with fluid and vital interdisciplinary conversations that could produce interesting work? I am more concretely interested in the second perspective. As someone who has developed his intellectual toolkit in an interdisciplinary program I felt some discomfort with the apparent disinterest for what is going on in other disciplines, especially on the specific topic of materiality. Just to cite a (recent?) publication I would suggest the volume edited by Daniel Miller, with the creative title of "Materiality," Duke University Press, 2005. The scope of the book is already telling of one simple truth: fruitful reflections about hard subjects come from dialogues across disciplines, time frames, geographic areas of specialization, cognitive, and cultural contexts, modes of analysis. The problem is: are we open enough to engage with such endeavor? It would be paradoxical if historians of technology would miss the opportunity to give their contribution on such an important challenge. With one example, Dagmar Schäfer has shown us that as we move in space and time we discover ways of thinking about materiality that may reveal new ways to approach this problem. It is that simple and yet something is keeping many of us from experimenting. Why? My proposal to grapple with materiality and the history of technology from a methodological point of view comes with the spirit of the practitioner interested in understanding how others deal with the same problem. For this reason I would be interested in hearing from other junior colleagues about the possibility to create a space at the next SHOT meeting in which we can carry on this reflection and interrogate in a fruitful way our current limits in our own research. I have informally received positive feedback on this idea, but I think that we should unite and make a concrete proposal. I would like to thank Sara

Pritchard, Michael Collins, Darma Thompson, Dragmar Schäfer and Gabrielle Hecht for starting this conversation and for showing that with a little transgressive act (just changing the position of the chairs and forming a circle) the discussion became more dynamic simply because everybody was more engaged! I also want to express my enthusiastic reaction to the proposal of having threaded panels at SHOT. We organize our intellectual production around concepts (at least this is the way I like to think of what I do), why then during conferences do we transform into formal panelists more anxious to read the paper right than interested in engaging with our audience?

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Learning from Disaster? The History of Technology and the Future of Disaster Research

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Life in the Second Environmental Disaster

The United Nations Office for Disaster Risk Reduction estimates that globally since the year 2000 disasters have killed 1.2 million people, affected 2.9 billion, and claimed $1.7 trillion dollars in material damage. The United States has moved into a "new normal" of frequent, billion-dollar hurricanes. Nine of the ten costliest hurricanes in United States history have hit since 2004, at a cost of over $200 billion. An additional $100 billion has been lost to riverine and flash flooding since 2003. Insured flood losses in the United States in 2012 reached $58 billion.

The United States has since World War II been engaged in the most rapid and sweeping process of population movement since the great waves of migration of its industrial age. On the road to risk the nation has met nature far more than halfway, and today we find ourselves in the midst of a "second environmental disaster." Like the first (and still ongoing) environmental disaster—environmental degradation and health threats caused by industrialization, first seriously addressed in the 1960s—the second environmental disaster reveals the downside of American growth and economic success. Its history is the success story of postwar American suburbanization, turned on its head. Postwar deindustrialization, alongside federal policies of home-lending and highway construction initiated a mass exodus away from eastern and midwestern cities and into surrounding metropolitan regions and hazard-prone southern/western states. Today, more than a third of Americans live in coastal shoreline counties, an increase of 39% since 1970 and higher than at any point (!) in U.S. history. While the concentration of population in coastal regions has created wealth, it has also placed vastly more people and more property in previously undeveloped floodplains and hurricane zones, and into harm's way. Despite this harrowing reality, the dominant disaster paradigm of the early 21st century United States has been homeland security against terrorism. With over half a trillion dollars lost to environmental disasters alone since 2001, the U.S. has also spent almost a trillion dollars creating a "homeland security" state in response to the September 11 attacks.

Climate change and sea level rise today portend longer and more destructive hurricane seasons in the years to come, an ominous forecast given that the number of shoreline residents in the United States is expected to rise another 8% by 2020. Looking further ahead, a 2013 study for the Federal Emergency Management Agency (FEMA) predicts 80% growth in National Flood Insurance Program policies written by the year 2100; the study speculates that "30% of the estimated increase in policies is due to population growth and approximately 70% is due to climate change."

Historians of technology and science—working together with STS colleagues—have powerful tools to apply towards the work of reducing disaster losses globally in the 21st century. Disaster research is in fact a wildly interdisciplinary intellectual ground, comprised of the humanities and social sciences, and converging frequently with more practice-focused communities in city planning, emergency management, public health, public policy, engineering, and the natural and physical sciences. In other words, interdisciplinary problems serve as magnets for interdisciplinary research, and disasters surely cut across realms of knowledge and practice in an unparalleled way.

Historians of technology have a very specific role to play in offering "longitudinal" perspective, charting hazards and risks, technical epistemologies and languages, and disasters themselves across historical time. Historical research is also highly attuned to comparative analysis, discovering and connecting expert and organizational cultures across disciplinary, organizational, and national boundaries. These skills are useful as we try to understand the ways that hazards are created, risks are calculated, and policies of disaster management are enacted. Disasters themselves are scrutinized for the ways they are used to frame and reframe arguments over nature, technology, corporate power, and the role of the modern state in protecting citizens. And, of course, historians of technology are particularly well-poised to "un-black" the black box of technology, demonstrating the material and also the political mechanisms of technical knowledge and artifacts. Many from the history of technology community have worked influentially in this area for years and years. But the need for even more historical understanding is at this time acute. If we do not continue to fill this void of knowledge, others will do it for us.

Historians can participate in interventions at levels that might not seem dramatic, but promise tremendous impact—through scholarship first, and in our roles as educators (many of us teach future technical and business professionals), and moving out into work with teams of scholars that actively engage citizens, experts, and policy-makers. The vibrancy of disaster research has been obvious in the pages of *Technology and Culture* since September 11, and even more visible in the 2011 co-located (HSS, SHOT, 4S) plenary session on "Dealing with Disasters," with Gabrielle Hecht, Hugh Gusterson, and Spencer Weart. At the 2012 annual meeting, the SHOT Prometheans SIG brought together 17 papers around the topic of "Historical and Contemporary Studies of Disasters." The 4S meeting that same year featured (among many others) four linked panels dedicated to the topic of Fukushima. Later this year an interdisciplinary Disaster-STS research portal will go live on the web. Disaster research is emerging as an established subfield in the larger field of techno-scientific inquiry.

Members of this community have also provided information and perspectives to the media (it would be wonderful if SHOT had a "press bureau" aimed at directly connecting members to the media!) Historians from this community have also

advised official panels and investigative bodies on risk and disaster topics. It is likely a mistake for us to sit by the phone waiting for a Senator to call and ask for advice about the next disaster. Historians are often reluctant to aggregate empirical historical cases into policy lessons and advice, and there are solid reasons for this caution. At the same time, waiting for relevant disaster research to organically "find its way" into public discourse is, to me at least, a failure of professional responsibility, and of imagination.

Below you will find four brief essays. Each in its way grapples with an issue I find especially challenging and/or promising for future scholarship in the hybrid discipline of disaster research.

Disasters Are Not Natural; Disasters Are Not Technological

Is there a word more seemingly innocuous and yet deeply politicized than "nature"? If so, maybe that word is "technology." And these are the two most common descriptors for disasters, an extension of the broader cultural tradition of dividing the world into spaces beyond human control (nature) and within our control (technology). You have nature, and you have the machine—givers of life and happiness, with the occasional storm or flat tire to be endured and mended. This commonplace division of taxonomic labor tells us a great deal about the societal failure to imagine disasters as political processes, both as products and agents of historical contingency. We know now from the long-term perspective of sociotechnical study that nature is inseparable from every aspect of human activity, and technology has slipped the bounds of expert control.

It is the manufacture of "second nature"—technological systems at the interface of water and land, urban space and less developed space—that creates the contexts of modern disaster. As geographers Gilbert White, Ian Burton, and Robert Kates argue in *The Environment as Hazard*, "vulnerability to the risk of a destructive storm . . . [is] the corollary of seeking beneficial use of land resources. Increased hazard accompanies increased material wealth" (p. 23). The process is well documented across the social sciences and humanities, so why do "natural disasters" live on in the face of so much evidence of disaster-producing environmental transformation? Many reasons perhaps, but the most direct, as historian Greg Bankoff explains, is that "it suits some people to explain them that way." Follow the power and the money right to the disaster zone. A complication: it's not just the elites who create and condone the naturalization of disaster. When we interrogate the natural and the technological in our disasters, we find ourselves looking at multiple overlapping motivations and methodologies for either accepting or hiding the hazards in our midst. Transforming coastline or uranium into profit and power also creates jobs, tax revenue, educational programs, professions, and a hundred other desirable features of modern society.

Still disasters do not affect populations equally; disaster losses (human and material) reflect the underlying social stratification of a society. Almost invariably marginalized groups live in more risk-prone geographies, and by definition they have fewer resources with which to confront loss: less money and credit, lack of professional networks or access to political power. Disaster researchers have built these findings into a "vulnerability paradigm" with tremendous value towards understanding how the experience of one disaster can be radically different across a single society, even one as rich as the United States or Japan. "There is no such thing as a natural disaster!" has in fact emerged as a critique of power, invoked not only by quiet researchers, but also more powerfully by vocal activists adding "disaster justice" to similar calls for environmental justice and worker's rights.

If we choose not to uncritically accept disasters as natural or technological, then we need to promote new analytical frames. It's not enough just to adopt another phrase like "weather-related" or "system failure," if we continue to allow politics to hide within disaster language. Historians synthesizing environmental and technology history have given us the concept of an "envirotechnical system," helpfully encouraging us to accept no tidy boundaries between natural systems and technological systems. Joel Tarr collapses the false dichotomies between the natural and the technological through close historical reading of industrial urbanization in his many articles and essential collection *The Search for the Ultimate Sink: Urban Pollution in Historical Perspective*. A recent article on the 3.11 disasters by Sara B. Pritchard explicitly moves envirotechnical analysis into disaster research, noting that it "is precisely the complex, dynamic, porous, and inextricable configuration of nature, technology, and politics that together helps us understand all that the single word 'Fukushima' now signifies" (*Environmental History* 17, April, 2012, p. 233). We must come to further understand the expertise, the policy, and the private incentives for cultivating a hazard, and for normalizing the disaster when it comes—translating it into an aberration, a thing unexpected. We should document the naturalization process of natural disaster and the deterministic constructions of technological disaster. In doing so we locate those organizations and people for whom the apolitical rendering of disaster is a necessary act by which to allow the risk-taking of late capitalism to proceed apace unchallenged.

A Temporary World

Several years ago I sat on a panel at the Annual Natural Hazards workshop with my colleague geographer Jim Kendra (director of the Disaster Research Center at the University of Delaware). It's an extraordinary meeting, really the only one of its kind, and it has been bringing together social scientists, emergency management practitioners, and public officials to discuss disaster research and professional practices since the 1970s. I spoke about the process of connecting disaster research to emergency management practice, and gave historical examples back

into the 19th century where similar research-practitioner connections had been facilitated effectively. The next speaker was an emergency doctor from New York City who told chilling tales of her work in post-Katrina New Orleans. The doctor received every question asked from the floor, and when the session ended she couldn't get out of the room, cornered by fascinated attendees (mostly emergency managers) with questions and their own stories to relate. Her actions responding to disaster were, really and truly, heroic in a meaningful sense of the word. I was describing a slow and unsteady process of disaster knowledge taking shape—hers was the realm of disaster as an urgent event, with lives in the balance. Tending to the sick and dying at Louis Armstrong airport the doctor had no time to ask questions about the history of the failed levee system or to speculate about the time it might take to rebuild the city.

In emergency management the experts refer to a "disaster cycle" divided into four phases: mitigation (structures and plans for protection), preparedness (activities focused on imminent events), response, and recovery (long-term economic and human renewal). But the response phase is the one that commands their attention, the phase for which they perform drills ahead of time and later receive PTSD treatment. The response phase is generally conceived as "the real disaster," with events unfolding fast. And it's true that disasters seem to construct a sort of temporary world, marked by moments of violence but also empathy, scenes dramatically framed by media. In the temporary world Presidents make "disaster declarations," enabling billions of dollars to flow into stricken areas. Public officials and disaster experts across the disciplines promise that the causes of the disaster will be studied and met with action. Citizens pledge to hold neighbors close as they rebuild. Disaster sociologists (working for civil defense officials modeling the effects of nuclear war) of the 1950s-60s studied hundreds of communities under the stress of disaster and came to some important conclusions. Communities adapt and improvise in disaster, and people don't fly to pieces or turn their backs on their neighbors—it's not *Lord of the Flies*. Looting (the great red herring of disaster) is extremely uncommon. As it turns out the civil defense experts promoting command and control procedures were paying for research that demonstrated their own flawed assumptions about human nature and the presumed need for outside experts to calm the public in times of disaster. Importantly, this realization (if it was ever made) did not cause civil defense officials to close up shop.

In the temporary world that a disaster makes people find themselves involved in a heightened level of social interaction and stress to be sure. Yet, people also don't really behave that differently from the ways they do in their normal lives—they still rely on community and local networks, they obey the law, and they work with what they have to solve problems. This is a comforting realization, but it can also be a letdown—especially when government functions with the same gridlock as before, and the promised changes (new levees, strong

building codes, better regulation of nuclear plants) get negotiated down to little or no change at all. Emergency managers are particularly frustrated when they are expected to transform the temporary world into a permanent one—when they are asked to magically undo flawed regulatory regimes, unscrupulous land development, and poverty. Whereas response focuses the public's attention, mitigation, preparedness, and recovery involve long-term commitments to research, infrastructure spending and maintenance, and financial commitments to reducing community and individual vulnerabilities.

An ironic trap of the "disaster cycle": 99% of the time it is a disaster event with a major response and media attention that provides the rationale for funding all of the other work entailed in mitigation, preparedness, and recovery. Failure to do these activities can make a disaster worse than it might have otherwise been (think Katrina) in 1000 ways, but it takes a horrifying disaster to excite public attention. There is no recent disaster on record that has transformed the soul-searching moments of the temporary world into a permanent system of precaution. From 9.2 scale earthquakes to Category 5 hurricanes to a "triple disaster" in Japan we have seen no disaster powerful enough to seriously derail the forces of development that produce hazard in the modern world.

Disasters Are Slow

"Violence is customarily conceived as an event or action that is immediate in time," explains environmental scholar Rob Nixon in his new book *Slow Violence and the Environmentalism of the Poor*. "We need," Nixon argues:

> to engage a different kind of violence, a violence that is neither spectacular nor instantaneous, but rather incremental and accretive, its calamitous repercussions playing out across a range of temporal scales . . . The long dyings—the staggered and staggeringly discounted casualties both human and ecological that result from war's toxic aftermath or climate change—are underrepresented in strategic planning as well as in human memory (p. 2-3).

If we apply Nixon's analysis to the subject at hand we begin to think through what it might mean to frame disasters not as specific terrifying events demanding immediate response, but rather as long processes of environmental degradation and deferred maintenance on technological systems. The slow disaster stretches both back in time and forward across generations to indeterminate points, punctuated by moments we have traditionally conceptualized as "disaster," but in fact claiming much more life and wealth across time than is generally calculated.

If disasters are slow, they also overlap in time and geography (and in cultural awareness stoked by both social and conventional media) with an urgency that

feels new and unsettling. Rosalind Williams observes in *Aftermath: The Cultures of the Economic Crisis* that by the time of the 3.11 disasters in Japan:

> it was evident that contemporary discussions of *crisis* and *aftermath* were . . . generating a set of new metaphors to describe contemporary history. . . . In a sort of collective exercise of free association, an image of fluid flow kept being repeated: a "spill" (especially in 2010, when the Gulf spill was on everyone's mind), a "flood," an "ash cloud," or, most persistently, a "meltdown." At the back of these images no doubt is that of the falling towers of the World Trade Center, which seemed to turn into fluid as they collapsed in a cascade. In all these cases, the locus of vulnerability sets up ever-expanding circles of trouble, which intersect with those from other such points, in a new historical pattern of intersecting and mutually reinforcing calamities (p. 29).

Is this what it means to live in Ulrich Beck's *Risk Society*, working to sort out individual risks while it becomes more and more clear we are simply *living in disaster* with no break or return to ordinary life? Beck cautions against the complacency made possible by the global dispersal of disasters and the general faith in the west that science and technology can overcome any obstacle. Beware of the "boomerang effect," Beck warns, an unwanted return on overseas investment in the form of climate change, radiation, and epidemic disease that no wall or distance will repel.

Anthropologist Kim Fortun characterizes the process as one where we see slow and fast disasters side by side as features of what she calls "late industrialism." In this construct we should be expecting "increasing incidence of both acute disaster—such as BP's Deepwater Horizon disaster, the Fukushima disaster, or the Bhopal disaster—and *chronic*, slow disaster, which almost always follows acute disaster, but also can emerge separately, and more quietly–the global asthma epidemic, for example." (Fortun, 2013) In the quieter moments we might also describe the slow disasters of late industrialism as packaged in containers of "acceptable risk." The concept of risk as applied today implies the possibility of objective analysis of any system, assigning variables, measuring and calculating, and coming out with a number. The number allows engineers, investors, policymakers, insurance companies, and consumers to determine whether a particular product or course of action is acceptable or not. Historically speaking, risk calculations are highly contextual and subjective (despite claims towards objective authority), and they often let their creators and users down. Living with acceptable risk implies safety is achievable through studious data gathering and calculation. If we assume instead, though, that that we are already living in (slow) disaster, then we must grapple with the idea that a factory with an x% risk of exploding every year is already putting carbon into the atmosphere and toxins in

the soil. The workers going to the factory are also putting carbon into the atmosphere and breathing pollutants on the factory floor. Even in profitable success the factory is an agent of slow disaster.

Deferred maintenance might be another way to think about slow disasters. According to the 2013 American Society of Civil Engineers (ASCE) "Report Card for American Infrastructure" the nation scores a dismal D+. Globally, the quality of U.S. infrastructure has slipped from 7th to 14th place according to a recent World Economic Forum report. The 2007 collapse of the Mississippi River bridge in Minneapolis, the failure of the New Orleans levee and dewatering system in Hurricane Katrina, the "Northeast blackout of 2003"—each case shows us through disaster what it means to have a nation that is physically falling apart. A slow infrastructure disaster is playing out in a thousand places across the country, sometimes punctuated by a dramatic moment. So, how to we raise the grade? Investment of $3.6 trillion by 2020 should do it according to the ASCE. Polls tell us that Americans across the political spectrum support federal spending (in principle) to upgrade the infrastructure, while other research tells us that elected officials see few electoral advantages in supporting projects that pay off years after they have left office. New infrastructures to support high-speed rail (to take one example) are rejected (in the U.S.), while programs of aggressive maintenance for our existing transportation infrastructure are stalled. And thus we live in a condition of deferred maintenance.

There is a political price to pay for losing the disaster concept as it is generally applied. Historians of this community who work on workplace and consumer safety, accidents, public health, and environmental justice know all too well (and have nicely documented) the obstacles that dispersal across time and space present to those who would bring about higher levels of safety for human life and health. Raising a dispersed pattern of auto accidents or food contamination to public consciousness and policy action has traditionally only been accomplished through aggregation and recognition of a sleeping "disaster" in our midst, and/or through direct political action (unions, consumers organizations) operating in civil society. Any discourse around exchanging fast for slow disaster concepts must grapple with the larger political struggles constantly at play over defining priorities for safety and regulation in a democracy.

Questions abound: if we don't assume that disaster is a discrete one-time event—then how do we proceed with our policymaking, and our research? Take it further and challenge the event itself—what was the "real" disaster in Hurricane Katrina: the wind, the water, the breach of the levees, the failure of the pumps, the drownings, the failures of FEMA? When did it begin and when did it end—and how many perspectives must we collect to be sure? When is recovery over—when the levee is rebuilt, the population returns, or the last federal aid dollar expended? The answers will no doubt be tantalizingly variable. As a thought experiment to start:

exchange the temporal and spatial fixity of disasters for the slow disaster, what previously obscured vested interests come into view?

Learning from Disaster?

In observing patterns of risk-taking we see the values of a society. Decision-making processes—some open and democratic, some sealed behind the walls of technical and corporate privilege—lead to the toleration of some risks and not others, for some citizens and not others. And, from these deliberations flow the artifacts of risk governance: land use laws, building codes, protective infrastructures, inspection protocols for technological systems, pollutant control regimes, toxic exposure guidelines, emergency management handbooks. These artifacts and the politics they represent are generally so esoteric, or so secretively managed, that the power relations inherent in risk-taking recede from view. In the human development of risky ecologies (cities in flood plains, nuclear power plants on fault lines) we note the evolution of modern risk as a seemingly natural, inevitable, expertly managed function of industrialized life.

Disasters bring the formlessness of risk calculations into shape, in the faces of victims, or the wreckage from a hurricane. Disasters also bring risks and their managers back into public view and under scrutiny, at least for a time. The rapid and confusing flow of events in the midst of a disaster makes it a difficult space for the review of a particular risk and its history. As such, formal disaster investigations have long stood as the venues through which chronology, causality, and blame are allocated after a disaster. The earthquake-resistant building codes, the levees, the back-up generators—none can be restored to normalcy, to profitability, without the formal study and closure that investigation provides.

Analytically it makes sense to start by doing some lining up of interests, asking: who wants the investigation and what do they want from it? An investigation may at one and the same time satisfy a professional organization but not a regulatory agency—a legislature but not an executive—one interested group of citizens, but not another. Moving past the notion of a disaster investigation as a simple technical problem we can pretty quickly see the risks that investigation itself entails, particularly for interest groups who are keen to mobilize investigation towards a political aim. For example, an investigation might stall reformers long enough to drain the energy out of their pleas for real change. Investigators might collect evidence that is then kept secret, doing harm to the ability of victims to know the totality of their situation. Investigations sometimes come in lieu of legal proceedings; but, on the other hand, they might pave the way for legal proceedings. They might channel the anger of interest groups. Or, they might prove a satisfying matinee—believable enough to allow people to keep faith in the technology, the private sector, or government. Each of these options is possible. I'm not offering a

formal taxonomy, just suggesting the difficulties we experience when society simply expects the disaster experts to get together and agree on the truth. Learning from failure is central to the epistemologies of science and engineering, but the professional value of such learning goes well beyond design enhancements. The performance of "learning from disaster" is also a political act, placing technical experts in positions of power over the processes of sense-making and blame-laying.

When scientists and engineers leave the lab and enter the investigative team they assume a temporary role as arbiters of disputes that have often become (often instantaneously) hopelessly politicized. The disaster experts mobilize the methods of their technical disciplines: they wield facts, discoveries, and authoritative, peer-reviewed reporting in the name of closing the debate over what happened, why it happened, and how to avoid it happening again. The stakes are high—if the experts investigate a disaster and can't determine what happened, or determine that it could not have been avoided, this opens the way to some serious anxiety about the hazards in our midst.

When disaster engulfs an area already struggling under the weight of industrial pollution the results can be doubly toxic, and even harder from which to draw concrete "lessons." Sociologist Scott Frickel makes this case in his studies of the post-Katrina environmental politics of New Orleans. He follows the trail as fears of a "toxic gumbo" swamping New Orleans were raised in the immediate post-disaster period. The Environmental Protection Agency (EPA) and Louisiana Department of Environmental Quality (LDEQ) officials dutifully tested and declared the "gumbo" to be not as harmful as people had worried, after all. Frickel takes issue with the conclusion, and in doing so introduces a provocative new concept: "organized ignorance":

> The tests the EPA and LDEQ have conducted are based on the compartmentalization of ecosystems into discrete media (e.g., air, soil, and water). These testing regimes, in turn, correspond to media-specific disciplines (e.g., aquatic toxicology), regulatory bureaucracies (e.g., LDEQ's Water Quality Assessment Division), and federal regulatory frameworks (e.g., Clean Water Act), each of which develops understandings of environmental contamination in ways that stand at some odds to ecological reality. In short, we have organized knowledge in ways that ensure we will not really know what is happening in the ecosystems we study. This is [a] . . . form of organized ignorance (*Technology in Society* 29 (2007): 185).

This example demonstrates the critical role of the disaster researcher in explaining the ways that expert risk-focused organizations acting in the public interest may be propagating disaster by way of learning from disaster.

Writing in the aftermath of Hurricane Katrina, Stephen Hilgartner beautifully summarized the contributions of sociotechnical research to the analysis of disaster investigations, identifying a set of recurrent themes that I have condensed (added to a bit) and reformulated into three main propositions (*Social Studies of Science* 37:1 (February 2007): 153-158).

1) *Disasters are not "natural," and they are not aberrant*. In industrialized societies disasters are "normal," the by-products of the forces of modernization, particularly urbanization, industrialization, and the creation and maintenance of complex technological systems.
2) *Political legitimacy in the modern state relies in no small part on the successful management of high-risk technological systems*. Likewise, after a disaster occurs, legitimacy relies on relieving victims, fostering recovery, and restoring public faith in the ability of government and industry to anticipate and prevent disaster recurrences.
3) *Disaster investigations aspire to soothe public fears and restore faith in experts*. Yet, investigations may reveal negligence that opens the door to sustained critiques of corporate, regulatory, and/or governmental leadership. With so much on the line, disaster investigations may result in multiple parties trying to shifting blame one to the other, with associated efforts to limit the power of investigators, thwart their work, and distort the evidence necessary to draw conclusions.

These three themes represent the foundation upon which any critical analysis of modern disaster investigations should be grounded. However, new disasters reveal developing historical trends, and they present instances for revising established theories in light of new evidence. Investigations of the World Trade Center collapse, Hurricane Katrina, and now the Fukushima disaster show us: 1) the crisis of assessing regulatory effectiveness amidst the trend towards deregulation, 2) the "discovery" of vulnerable populations, 3) the struggle over defining the appropriate and authoritative investigative body, 4) the widespread use of the Internet and social media as tools of citizen dissent, 5) the rise of "sustainability" as an organizing principle for technological change, 6) the struggle over risk modeling as a method applicable to risk regulation, 7) the struggle over defining the "dominant" disaster in multi-causal disaster episodes.

It is common to claim that a disaster opens the door to learning from mistakes—the assumption tucked into this thought is that disasters are productive of better technology and smarter risk-taking. The disaster investigation is the laboratory and the courtroom of such deliberative acts. What characteristics do disaster investigations share in common? Starting with the idea that they are summoned to find the truth, we must also be willing to accept that disaster

investigators and their truths are embedded in society, and embedded in multiple overlapping societies at once. Investigation is a normal outgrowth of the very techno-scientific mode of thinking that brings high-risk technological systems like nuclear power plants into existence in the first place. Without an investigation the system that fails cannot be redesigned and restarted. Could such an investigation ever conclude that it is time to switch off the machines that threaten disaster?

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Disability Studies Talks Back to Science and Technology Studies

In 1980, Langdon Winner lodged disability at the center of the history of technology canon with the publication of "Do Artifacts Have Politics?" For Winner, inaccessible civic infrastructure exemplified the ways unintentional bias is built into technology:

> The organized movement of handicapped people in the United States during the 1970s pointed out the countless ways in which machines, instruments, and structures of common use—buses, buildings, sidewalks, plumbing fixtures, and so forth—made it impossible for many handicapped persons to move about freely, a condition that systematically excluded them from public life. It is safe to say that designs unsuited for the handicapped arose more from long-standing neglect than from anyone's active intention. But now that the issue has been raised for public attention, it is evident that justice requires a remedy. A whole range of artifacts are now being redesigned and rebuilt to accommodate this minority. (125)

Contemporary disability activists and scholars pushed this logic even further, arguing that "handicap" is itself an effect of artifacts and architecture. They also objected to the pervasive use of disability as an exemplar in literature and scholarly critique. David Mitchell and Sharon Snyder call this the "double bind" of disability representation: disability is ubiquitous as a symbol, metaphor, or basis for analogy, but it rarely receives sustained attention.

Unbeknownst to many historians of technology—among other branches of the broad field I'm abbreviating here as STS—scholars in disability studies have engaged with their work for at least two decades. This engagement has often been critical, pointing out misrepresentations; a lack of diversity in presumed users, readers, listeners, and spectators; and even problems with scholarly access (for more on this last issue, see the HASTAC Scholars Forum on classroom and electronic accessibility). At the same time, work at the intersection of these fields has burgeoned in the last few years, as historians of technology make disability central to their projects and disability scholars take up methods and theories such as "values in design." In advance of the Portland conference, and as a provocation for a more direct set of conversations, this post offers several excerpts from landmark disability critiques of STS.

Paul Longmore and David Goldberger on the history of medicine

"The League of the Physically Handicapped and the Great Depression: A Case Study in the New Disability History," *The Journal of American History* (December 2000): 879-891.

Recent research confirms the historian Douglas Baynton's observation: "Disability is everywhere in history, once you begin looking for it."

Why then have historians omitted disability from their accounts? They may have assumed a dearth of primary sources; in fact, new research demonstrates sources in abundance. Scholars may also have avoided the subject because, as psychological studies have substantiated, disability often elicits "existential anxiety." Most important, an ideology of disability as a product of nature has seemed to obviate the need or possibility of studying disability as an artifact or construct. The medical paradigm dominant in modern societies has framed disability as limitation in social or vocational functioning due to chronic medical problems. By casting it as a matter of pathology, the medicalized perspective has individualized and privatized disability, effectively restricting historical investigation or interpretation. A merely "personal" condition, it defies systematic study.

While some medical historians have reconstructed the sociocultural experience of illness and the impact on public discourse and policy making of social values concerning disease and health care, they have largely focused on the functioning of health care institutions and responses to epidemics and the critical phase of diseases. Few people with disabilities spent much time in hospitals or institutions. The perception of them as socially impaired by medical pathology did impinge on them in other social settings in their contact with social workers, educators, vocational rehabilitation counselors, and other nonmedical professionals, but scholars have usually failed to look in those places. Historians of workers' health have examined workplaces, but the medical paradigm has focused their analyses on the evolving explanations of the causes and courses of occupational diseases and disabilities and on safety, treatment, and compensation measures. Though that scholarship frequently mentions job discrimination against workers regarded as disabled, it does not delve into that theme. Nonetheless, public health historiography bears importantly on disability history.

In addition, the medical approach, by typically regarding disabled people as patients or dependent objects of charity, has thereby rendered them historically inert or invisible. Older histories of "the deaf" or "the blind" made them passive recipients of the benevolence of those regarded as the real historical agents: hearing or sighted professionals and philanthropists. Policy historians have similarly traced the creation of the "disability category," but disabled people generally enter the story as historical actors only when, in the late twentieth century, a broad-based disability rights movement compels attention. In many fields of historical inquiry where disability was significant, the medical pathology perspective has located the causes of alleged social incapacity within "afflicted" individuals, thereby excluding consideration of cultural, social, and political factors in the construction of disabled people's identities and roles and overlooking disabled persons as historical actors.

Elizabeth Bredberg on social construction and Foucauldian histories

"Writing Disability History: Problems, Perspectives, and Sources," *Disability and Society* 14, 2 (1999): 191-192.

Unlike their clinically orientated predecessors, contemporary authors writing within disability studies are often critical of institutional treatment of disabled people. Despite this stance, they continue to represent disability history as predominantly the history of institutional practice. This persistence is explicable to a certain extent by the nature of disability studies and of their political and emancipatory dimensions. Both the influence of the social construction model and the strong influence of Foucault's theories of power relations have led writers of disability histories to examine the historical role of institutional responses to impairment. In addition, the source material that has been generated by institutional practice constitutes a large and accessible resource for historians…

In addition to policy analysis, and examinations of societal and institutional responses to impairment, however, disability studies draw on analytical personal narratives (e.g. Zola, 1982) and literary expressions (e.g. Fries, 1997) of the experience of disablement as an important part of their resources. This aspect of the contemporary investigation of disability still lacks a significant counterpart in disability history, in which accounts of the lived experience of disabled people remain very much under-represented. Disability history, in ironic consequence, seems to sustain the depersonalised and institutionalised representation of disabled people that its authors undoubtedly deplore.

David Mitchell and Sharon Snyder on cultural studies of technology

"Introduction: Disability Studies and the Double Bind of Representation," in David T. Mitchell and Sharon L. Snyder, eds., *The Body and Physical Difference: Discourses of Disability* (Ann Arbor: The University of Michigan Press, 1997): 2, 7-8.

Rarely do scholarly discussions of the body in the sciences or the humanities anticipate that people with disabilities are part of their readership…

Over the past twenty years, even as disability rights advocacy has become more prominent, cultural critics have worked to demonstrate how the definitions of human "wholeness" and "integrity" are shifted by technological innovations. In this way, and in a more benign and sweeping fashion, disability underwrites the cultural studies of technology *writ large*…[E]ssayists on postmodern science and culture such as N.

Katherine Hayles, Avital Ronell, and Donna Haraway deploy disabled bodies as proof of our fascination with "cyborglike" prosthetic enhancement. The apparatus of disability shows up in numerous postmodern catalogs without comment on the conflictual relationship of disabled people to the equipment that theoretically affords them access to able-bodied populations, architectural structures, and cultural commodities. Nor is there any serious effort to specify the nature of this usage within disabled communities themselves…

All of these examples speak to the glaring omission of a disability studies perspective. Indeed, if one of the most common experiences of disabled people is that they are made to feel alone in their attempts to procure environmental access or to challenge the pathological narratives of their bodies presented in medicine and by the culture at large, disability scholars have experienced their own disciplinary and professional segregation and isolation.

Alison Kafer on the cyborg

"The Cyborg and the Crip: Critical Encounters," in *Feminist, Queer, Crip* (Bloomington: Indiana University Press, 2013): 105, 118.

Far too often, disability functions in cyborg theory—including Haraway's manifesto—solely as an illustration of the cyborg condition. Markedly absent is any kind of critical engagement with disability, any analysis of the material realities of disabled people's interactions with technology. Disabled bodies are simply presented as exemplary, and self-evident, cyborgs, requiring neither analysis nor critique…

"Pushing" the figure from a disability perspective entails bringing a disability consciousness to the cyborg, attending to the specific benefits and dangers it harbors for disabled people. This shift requires an acknowledgment that human/machine interfaces are not always beneficial or pleasurable; an awareness that many disabled people lack access to the cybertechnologies so highly praised in cyborg writing; an accounting for the ways in which cybertechnologies rely on disabling labor practices across the globe; and a realization that not all disabled people are interested in technological cures or fixes.

A non-ableist cyborg politics refuses to isolate those of us cyborged through illness or disability from other cyborgs. Disabled people, in other words, can no longer be cast as modeling a cyborged existence that nondisabled people have yet to achieve.
Such a move only strengthens the abled/disabled binary, suggesting that disabled people are fundamentally and essentially different from nondisabled people. If, as Haraway and others argue, technoculture is pervasive, then disabled people are not alone in the cyborgian realm. Cyborg theory could then turn itself to interrogations, for example, of why the very same technology is alternately described as "assistive" or "time-saving" depending on whether a disabled or nondisabled person is using it. In this framework, "cyborg" becomes an opportunity for exploring or interrogating the abled/disabled binary.

Vivian Sobchack on prosthesis

"A Leg to Stand On: Prosthetics, Metaphor, and Materiality," in *Carnal Thoughts: Embodiment and Moving Image Culture* (Berkeley: University of California Press, 2004): 207, 208.

Sometime, fairly recently, after the "cyborg" became somewhat tiresome from academic overuse, we started to hear and read about the "prosthetic"—less, in its ordinary usage, as a specific material replacement of a missing limb or body part than as a sexy, new metaphor that, whether noun or (more frequently) adjective, has become tropological currency for describing a vague and shifting constellation of relationships among bodies, technologies, and subjectivites. In an important essay called "The Prosthetic Imagination" that investigates the scholarly uses and abuses of the prosthetic, Sarah Jain writes: "As a trope that has flourished in a recent and varied literature concerned with interrogating human-technology interfaces, 'technology as prosthesis' attempts to describe the joining of materials, naturalizations, excorporations, and semiotic transfer that also go far beyond the medical definition of 'replacement of a missing part'"…

In all this far-reaching and interdisciplinary cultural work (and with the exception of disability studies), the literal and material ground of the metaphor has been largely forgotten, if not disavowed. That is, the primary context in which "the prosthetic" functions literally rather than figuratively has been left behind—as has the experience and agency of those who, like myself, actually use prostheses without feeling "posthuman" and who, moreover, are often startled to read of all the hidden powers their prostheses apparently exercise both in the world and in the imaginations of cultural theorists. Indeed, most of the scholars who embrace the prosthetic metaphor far too quickly mobilize their fascination with artificial and "posthuman" extensions of "the body" in service of a rhetoric (and, in some cases, a poetics) that is always located *elsewhere*—displacing and generalizing the prosthetic before exploring it first on its own quite extraordinarily complex, literal (and logical) ground.

Katherine Ott on "assistive" technology

"The Sum of Its Parts: An Introduction to Modern Histories of Prosthetics," in Katherine Ott, David Serlin, Stephen Mihm, eds., *Artificial Parts, Practical Lives: Modern Histories of Prosthetics* (New York: New York University Press, 2002): 2-3, 21.

Assistive technology is a variation of traditional prostheses; both assist with independent living and access to life- and work-related activities. Since all useful technology is assistive, it is peculiar that we stipulate that some devices are assistive while others need no qualification. Besides serving to stigmatize and segregate a benign and inanimate entity—a device or appliance—the term "assistive technology" also needlessly complicates understanding of the devices so designated. Identifying telecaptioning

decoders or voice recognition software as assistive technologies both reinforces outmoded categories of dependency and victimhood for those who use them, and tracks the technologies into professional and consumer groups where few people will find out about or benefit from them. The designation creates a technological ghetto at the margins of consumer and political culture. It also produces an odd logic. When is a widely used device such as the horseshoe-shaped neck pillow, insisted on by many long-distance airplane travelers and bedtime readers, merely a luxury item, and when does it become stigmatized as an assistive technology? Whose comfort is taken for granted and whose warrants qualification and justification? The same questions can be asked of such "assistive" technologies as sticky keys and zoom-text features on computers, or picture-based keyboards. In this sense, then, what do we say about typewriters and telephone headsets, or larger work site technologies like wheelbarrows and backhoes?

Sara Hendren on simple machines

To these scholarly critiques, I would add artist Sara Hendren's Slope:Intercept project, a series of interventions and meditations on the ramp or inclined plane. An old technology, simple rather than high-tech, the ramp is at once ubiquitous and invisible, overlooked by architects and historians alike. Ramps indicate a common desire for "alternate access" among skateboarders, wheelchair users, pedestrians with canes and strollers—and many others. This infrastructural element brings these individuals together, moreover, in public space.

Hendren has a design degree from Harvard and a Master's in history of science from UCLA; her disability and technology blog Abler is one model for the realization of a disability studies-inflected STS. Hendren describes herself as follows:

"I'm broadly interested in the expert cultures of medicine and techno-science, and in the possibilities for artists to be outsider-collaborators among those cultures. I'm influenced by Claire Pentecost's idea of the artist as public amateur one who consents to learn in public. So I seek out informal modes of learning, hacking, and experimentation; I also seek formal collaborations with specialists in science and technology, both to understand and extend the contours of acceptable questions in research paradigms."

Jenny Leigh Smith, Georgia Institute of Technology

Humans, Objects, and Surprise Endings: Where Technology and the Environment Intersect.

How does environmental history intersect with the history of technology? How do these two fields compliment each other? As a scholar with loyalties to both fields, I find I am in good company at SHOT, where I have many colleagues interested in these kinds of questions. I do not have a set of final, definitive answers to the intriguing but necessarily vague query of how environmental history might enrich and reinvigorate the field of history of technology, but I have a few suggestions, and I am very interested to hear what other SHOT scholars will have to say about this topic.

First and most importantly, for me, making the environmental central to the work I do in the history of technology provides me with an opportunity to take the anthropocene seriously, to consider what it means to live during an epoch in which "human activities have become so pervasive and profound that they rival the great forces of Nature and are pushing the Earth into planetary *terra incognita."*(Steffen, Crutzen and McNeill, 2007). What does it mean that the Earth will be a warmer, wetter and less biodiverse place in the future, and how have anthropogenic activities affected the global environment over the past two centuries?

Between 2003 and 2004, much to the consternation of the United Nations, Russian President Vladimir Putin delayed signing the Kyoto protocol to reduce greenhouse gases. He had numerous political reasons for the delay, but publicly he wondered if the global warming trend the Kyoto protocol was designed to stave off might not benefit Russia by increasing agricultural productivity and allowing Russian oil rigs better access to Arctic oil reserves. Ultimately, Russia signed the treaty. Afterward, Russian climate scientists stepped forward, insisting they had never believed global warming would be a net gain for Russia, distancing themselves from Putin's glib comments. However, Putin's contrarian, opportunistic observation about the potential benefits of climate change has influenced my own thinking about the anthropocene. Who stands to benefit from the geophysical changes of this new epoch, and who has already profited from its disturbances and uncertainties?

Secondly, although the fields of environmental history and the history of technology are distinct, they share an appreciation for some similar approaches to doing history, in particular a fascination with material objects. Although historians of technology devote much time and space to the centrality of objects as well as to the agency and their politics, I find that environmental historians are more daring and creative in identifying and deconstructing material artifacts that matter. Two examples of this are Nancy Langston's recent book, *Toxic Bodies*, where she tracks Diethylstilbestrol through different ecosystems, and Etienne Benson's work *Wired Wilderness*, about wildlife radio telemetry, in which he describes the irony of capturing, drugging, collaring and releasing these animals in order to study their natural behavior in a wilderness setting.

In my own research, I occasionally find it challenging to take objects seriously. For a project I researched on the long-term impacts of radioactivity on reindeer herds in

Northern Russia and Northern Sweden, I interviewed a Swedish reindeer biologist named Birgitta Åhman. The most memorable moment of the interview was when she handed me a vial of enriched reindeer feed pellets that she and several other scientists had developed in the months after Chernobyl as a way to prevent reindeer from absorbing too many radioisotopes through contaminated food sources. This specially formulated reindeer kibble was high in iodine and calcium as well as fat and other vitamins. Had the government chosen to mass produce the pellets, it might have saved the Swedish state millions of dollars as it sought to mitigate the effects of nuclear fallout from the Chernobyl disaster. Because they resembled nothing so much as Purina rabbit chow, I found it challenging to treat the little feed pellets as the nuanced natural-technological artifacts they were. However, for Dr. Åhman these pellets were crucial to explaining part of the history of radioactive contamination in Northern Sweden, and at her urging, they became central to the story I told as well. This is something I think environmental historians do especially well; they take mundane artifacts that may or may not be easily recognizable as either technological or natural creations, and they offer thick descriptions of how and why these objects are both natural and artificial constructs. Currently, it is this challenge of identifying the natural and the artificial in material objects that guides my own work, far more than an interest in exploring the agency or politics of relevant artifacts.

Finally, in both disciplines, my favorite historical narratives are those with surprising or unusual endings. As a historian of the Soviet Union, I especially love identifying cases where the Soviet regime got it right, where socialist values or Soviet bureaucratic procedures actually made the world a better place in some small way. Obviously, these cases are few and far between, but they do exist, and I find them to be the perfect counter to both the false, triumphalist official narrative of progress that dominated the Soviet era, as well as the acutely critical and often dismissive histories written about the regime by Western scholars and dissidents in the years since the Soviet Union's end The work of environmental historians has been incredibly valuable to me in crafting this approach, because environmental histories are willing to tell complex stories with ambiguous endings in very satisfying ways. Often in the history of technology, scholars stop once they have concluded that a legacy of technological change is complicated or multivalent. Environmental historians often go one step farther than this and spend time identifying the good, the bad and the ugly in the story they are telling. Sometimes this makes histories about environments harder to tell, but for me, this seems like the most honest way to tell the kinds of histories I find most compelling.

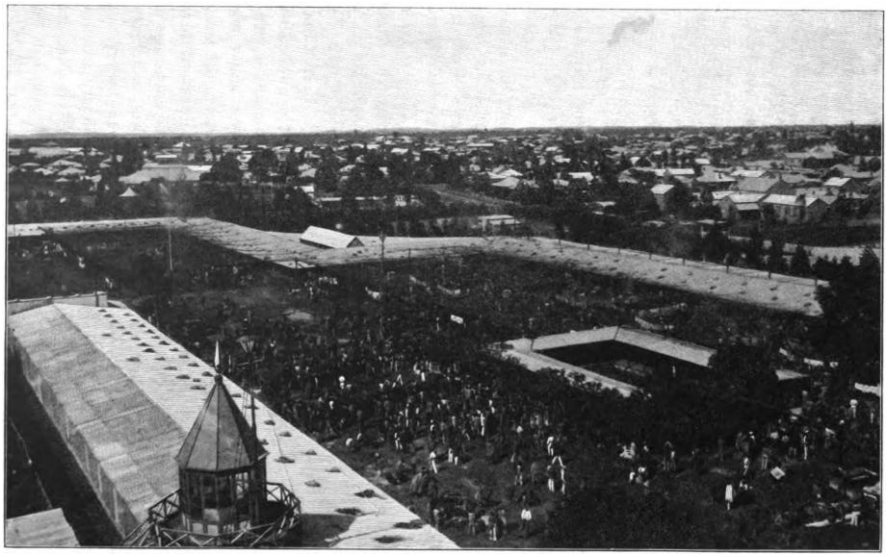
Bill Storey (History Dept., Millsaps College, Jackson MS)

Blog posting for SHOT 2013 plenary roundtable

"The Challenges of Materiality."

In graduate school in the late 1980s, studying about the British Empire and Africa, I was told that every historian interested in colonial southern Africa eventually found their way to Kimberley, the small city in the Northern Cape where diamond mining transformed the entire region's economy. It took me until a bright, cool morning in 2011 to pay a visit, in the course of research for the book I am writing about Cecil Rhodes, whose company, De Beers, still owns the Kimberley Mine, a.k.a. the Big Hole. The mine – one of five closed mines in the Kimberley area – is now a UNESCO World Heritage site, complete with a modern museum and visitors' center, as well as an extensive outdoor collection of mining equipment and structures. I walked through the gate to discover wonderful collections: miners huts, shacks, churches, saloons and banks have been moved to the site and restored. Old centrifuges and diamond-washing devices were on display, along with the home of the late nineteenth-century mine manager, the Californian, Gardner Williams, as well as tractors, trucks, and trolleys. The mine museum, re-opened in 2005, housed well-curated displays about the history of mining; a well-produced film about the discovery of diamonds in the late 1860s; and a vault with a dazzling display of thousands of diamonds of different types. A tour guide led me down into a restored mine shaft and returning to the surface I walked out on a platform suspended over the edge of the Big Hole. The mine crater is vast, occupying eighteen hectares. Looking from the edge, more than 200 meters below visitors can see a pool of water.

It is a dozen-odd meters to the bottom of the water. Under the water-filled crater, underground mine shafts went as deep as a kilometer. From 1871 until 1914, the mine produced 14,504,566 carats of diamonds, weighing 2,722 kilograms, by miners excavating 22,500,000 tons of ground, with much of the early work being done with shovels, sledgehammers, and black powder. The place and the objects gave me a sense of awe that reminded me of Roz Williams's descriptions of the sublime in her classic book, *Notes from the Underground.* Unfortunately, at the Big Hole the interpretation presented was not as impressive as the space and the collections. Like many museums that have to balance historical accuracy with tourism, the Big Hole curators have chosen to remain relatively silent about some uncomfortable things. The museum placards alluded to the dangers of mining yet did not reveal the full scope of risk and the rate of mortality. The history of labor migration was also smoothed over. Several display placards mentioned that African migrants were housed in closed compounds. These were developed in the 1880s as a way to stabilize the availability of labor and to prevent the stealing of diamonds. The Kimberley compounds provided a model for the intensive, industrial and residential compounding and segregation experienced on the gold fields and in many other parts of Southern and Central Africa, from the 1880s to the present day. We could even consider this to be the key social and technological imaginary for the history of modern Southern Africa. In the 1890s and 1900s, white visitors even came to marvel at the compounds. In my research at Kimberley's McGregor Museum, I have even found picture postcards of the compounds, produced around 1900, that must have circulated to some extent locally and globally. (Below I include a photograph of the compounds from Gardner Williams's book about diamond mining.)



In spite of (or perhaps because of) the importance of these early, influential compounds, the Big Hole Museum has not reconstructed them. Instead, the Big Hole Museum has accumulated material objects in order to convey to visitors a sense of the positive benefits of the colonial technological imaginary. The imaginary is conveyed not only through the preservation of the sublime mine pit and the large and small mine technologies, the "big" technologies, but also by associating them with the "small" or everyday technologies: the housing, the silverware, and the clothing, to name but a few. Those South Africans who embraced these technologies also embraced larger colonial projects. In my research about Cecil Rhodes and his socio-technical vision of imperialism in southern Africa, I have been trying to understand the relationship between the colonial technological imaginary, on the one hand, and colonial forms of materiality, on the other. The colonial technological imaginary consisted of the vision of colonial rulers for the proper ordering of technology, society, and politics, while materiality refers to the notion, taken originally, I think, from art and architecture, that certain material objects may produce certain psychological and physical effects on people. The full array of industrial, public, and domestic technologies at Kimberley helped to produce a sense of colonial order. The technological vision fostered by Rhodes and his partners was that their company, De Beers, would monopolize diamond production and marketing; that it would regulate the activities of European and African mineworkers carefully, primarily by housing them in white suburbs and black compounds where close surveillance was possible; and that the colonial government would support these processes by deregulating the mining industry and by restructuring African societies in such a way that labor could be cheaply funneled to the mines.

The sociotechnical vision of Rhodes and De Beers was enacted by the Cape Parliament, where Rhodes served as a member from 1880 until his death in 1902 – including a stint as colonial prime minister from 1890 to 1895. The vision was enacted in a number of ways, through changes to the laws about land

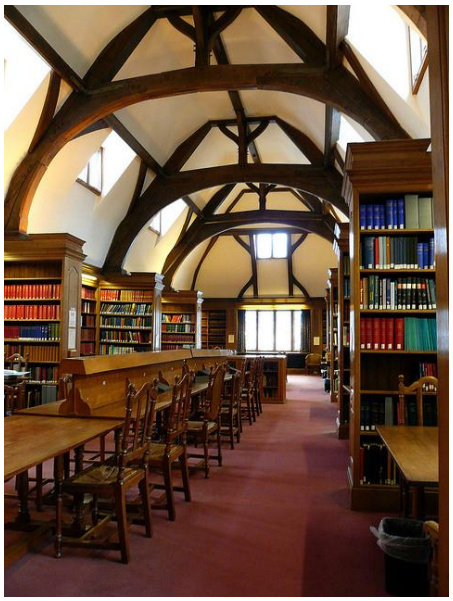
tenure in areas where capitalist miners and farmers recruited labor; support for a shift from diamond mining to gold mining and the acquisition of the Transvaal during the South African War of 1899-1902; the expropriation of the Ndebele and Shona and the colonization of Zimbabwe and Rhodesia; the introduction of British and American progressive farming techniques in Zimbabwe and on vineyards in the Western Cape; and the famous attempt to unify Africa by means of railroads and telegraphs.

Rhodes carried out his vision by many means. Among these he influenced the emergence of a peculiar architectural style that became common throughout the Empire. Working initially with the architect Sidney Stent in Kimberley, and later with Herbert Baker in various parts of southern Africa, Rhodes promoted a style that was intended to influence colonial consciousness. Rhodes personally favored Ruskin's Arts and Crafts style – Rhodes preferred to dress simply and his home, Groote Schuur, near Cape Town, was restored to reflect Cape Dutch craftsmanship. When he moved out during the South African War of 1899-1902, he instructed Baker to build him a much-simpler cottage on the grounds of his newly purchased Western Cape wine estate, Boschendal, pictured below.

The initial commissions of Stent and Baker tended toward simplicity, too – the white working-class bungalows of Kenilworth, near Kimberley, were spartan and functional, as were the farmhouses with corrugated iron roofs that imitated the style all throughout South Africa and Zimbabwe. In the 1890s Baker became Rhodes' favorite architect – he gave him multiple commissions and he also sent him to study the imperial architecture of Egypt and Rome. Baker and Rhodes' style began to blend Arts and Crafts nods to Dutch simplicity and workmanship with the columns and domes of imperial Rome that signified, to Rhodes, the coming together of many cultures under one form of government.

Rhodes died in 1902 but Baker's later commissions carried on Rhodes' vision. Until 1913 Baker practiced in South Africa, where he designed the government buildings of the new Union of South Africa. Nearby, in Johannesburg, he designed houses in wealthy suburbs. After moving to London in 1913, he continued to reel in major state commissions, including a collaboration with Edwin Lutyens on the government buildings in New Delhi. Some of the British Empire's best-known memorials to the First World War, Tyne Cot at Passchendaele, Ieper, and the Delville Wood Memorial near Albert, were Baker's work, too. Toward the end of his career, he designed Rhodes House at Oxford University. The home of the Rhodes Trust is a mix of Dutch gables and woody, craftsmanlike interiors, yet when visitors enter, they pass through columns, look up at a dome, and continuing straight ahead, can walk into a great hall that resembles a chapel, with a painting of Rhodes front and center, in the same place where, ordinarily, we would fine a crucifix. These, and Baker's other commissions, were meant to make a material impression

about the British Empire. Historians working on the Rhodes papers at Rhodes House Library experience the physical constraints of a space designed as a temple to Rhodes and his cronies!



To what extent can it be said that Rhodes and Baker sought to shape – and succeeded in shaping – colonial ideologies through technologies ranging from the everyday to the grand? The destructive and dangerous Kimberley mines were early examples of what the historian of U.S. mining, Timothy LeCain, calls "mass destruction." By this he means not only the massively destructive practices of the mining industry, but the ways in which mass destruction underpins capitalist economies – and the ways in which modern people, in many different ways, have gotten accustomed to mass destruction, making it easier to rationalize the destructive practices associated with the world wars, climate change, and nuclear weapons, to name but a few.

My sense is that historians of technology have embraced social constructivism and its variants, such as the co-production of technology and power, either on the grand scale or in the everyday experience of technology. It is not so extraordinary for me to make arguments about the co-production of technology and power in southern Africa – I already did that in my 2008 book, *Guns, Race, and Power in Colonial South Africa*. It seems to me that there are many associated questions about materiality that have not been fully explored by historians of technology, even though these fascinate the reading public. (I am probably not the only SHOT member who was impressed by the media interest shown in Sherry Turkle's recent book, *Alone Together,* where she explores the effects of new communications technologies and social media on our consciousness.) In some ways we have not risen to the challenges of materiality posed by some of our own colleagues. Two books come immediately to mind. Francesca Bray's 1997 book, *Technology and Gender: Fabrics of Power in Late Imperial China,* shows how household architecture and medical practices reinforced dominant Chinese ideologies, particularly those supporting ideologies related to gender. The structure of the household literally shaped the bodily practices of the inhabitants, conforming them physically to notions that upheld patriarchy and the state. Those of us who have read Francesca's book will recall that while she engages some of the social theorists who have written along these lines, including Bourdieu, Foucault, and Marx, her account draws on a range of written, visual, and physical evidence that will satisfy some of the most pragmatic historical practitioners. I imagine that I might be one of only a few people who wandered around the Kimberley Big Hole Museum, thinking about Francesca's book and the ways in which my body was being

encoded into viewing the world from the perspective of a white South African, circa 1900, to marvel at the diamonds and the gear, while remaining largely unconscious of the experiences of African miners below the ground. Another more recent book about materiality that has influenced my thinking a great deal is our SHOT colleague Joy Parr's *Sensing Changes,* which describes and analyzes the ways in which ordinary Canadians experience what she calls technological "mega-projects." Joy uses case studies to advance the argument that these technological mega-projects changed the environment to such an extent that they changed local people's sense of their own bodies, from a sense of home and contentment, to a sense of unfamiliarity and risk. The documentation comes from written sources and interviews, plus innovative analysis.

Following Parr and Bray, I am moving forward in an effort to understand materiality and coproduction at the mines. Social engineers like Rhodes, his mining partners, and his parliamentary colleagues, were enacting their sociotechnical vision on the very bodies of miners and farmworkers and their families as they circulated themselves through the emerging capitalist economies of southern Africa. This is the story that white South Africans once imagined they could deny. That being said, I am having trouble finding direct testimony. Even so, the methodological challenge needs to be met. Writing about the colonial society that Rhodes and his colleagues envisioned, landscape architect and environmental historian Jeremy Foster notes in his 2008 book, *Washed with Sun: Landscape and the Making of White South Africa,* that "topographical character, collective memory, corporeal experience, and cultural subjectivity play off each other in dialectical ways" (p.246). He continues in the same vein, writing that Rhodes's early twentieth-century heirs, "the colonial nationalists, for all their subscription to modern, liberal, constitutional metropolitan values, ultimately found it impossible to imagine a white man's country without imagining the mechanics of segregation" (p.256). The socio-technical imaginary of mining and agricultural capitalism holds nostalgia for some, but not all. Meanwhile, the BBC reported just recently from Zimbabwe that people living in rural regions have burnt several of the old, colonial-era, Arts-and-Crafts farmhouses to the ground.

I do not have a grandiose theory of materiality to offer. Instead, I present materiality to this audience as a problem of method that I struggle with and that I expect many of the rest of struggle with, too. An anthropologist of material culture, Daniel Miller, writes in his book, *Stuff*, that "The problem with materiality is that for some reason we seem on the whole to be not at all keen on it. There is an underlying principle to be found in most of the religions that dominate recorded history. Wisdom has been accredited to those who claim that materiality represents the merely apparent, behind which lies that which is real…. So, to start on this seemingly vast question of what is materiality, we had better admit that, whatever materiality is, it is something we often profoundly don't want to be" (p.69). I share this fascination with – and discomfort about – materiality. I'd like to raise materiality as a problem that, together, historians of technology could do much more to explicate, telling stories about many different technologies, in many different places, over many different time periods, that ultimately help us to understand the lives of extraordinary visionaries and ordinary people.

19 thoughts on "The Multiple Histories of Technology: Opportunities and Challenges"

1.  Lilly IraniSeptember 27, 2013 at 5:22 pm

   I'm responding appreciatively to Mara Mills' offering of disability studies speaking back to STS. Her contribution confirmed a suspicion I've held while studying design professions that STS needs to examine the discourses of humanity, wholeness, empathy, and dis/ability that pervade these very technological professions. Cyberculture has long had strains of technological practice that have coevolved with positive psychology, cyborg studies, and anxieties about human/machine difference. How can we understand the cultural stakes of these technological practices without taking seriously the ways those practices depend on images of human wholeness or ability, both in the promises technologists make to publics and also in the attributes professionals (e.g. Steve Jobs or the PR of design firm IDEO) assert that they uniquely possess?

   Edit

   1.  Meryl AlperOctober 3, 2013 at 10:05 pm

      Continuing the thread of response to Mara Mills' notes on the intersections between disability studies and STS (and I suppose, as a broader umbrella, history as a discipline?) As a Ph.D. candidate in a communication program (USC Annenberg School of Communication), I'm a late comer to both disability studies and STS. This has required happily falling down a number of Google Scholar rabbit holes to find the material I need in my own archival and ethnographic work on children with disabilites' use of computers and mobile devices for augmentative and alternative communication.

      One piece I came across in my search was the following: Vasilis Galis (2011) Enacting disability: how can science and technology studies inform disability studies?, Disability & Society, 26:7, 825-838, DOI: 10.1080/09687599.2011.618737. The article takes a theoretical approach of Actor Network Theory to bridge DS & ANT. On a more elementary level, as a junior scholar, it would be helpful for me to see mapped out the ways that DS figures into some of the big STS theories like ANT or SCOT or the Social Shaping of Technology (especially also considering scholarship that also presents feminist and indigenous takes, such as the work of Ron Eglash).

      Edit

      1.  Mara MillsOctober 4, 2013 at 4:15 pm

Ingunn Moser, Stuart Blume, and Gerard Goggin did important early work at the intersection of these two fields–with a specific focus on communication technologies. And Lisa Cartwright and Brian Goldfarb were teaching a disability and technology course already in the 1990s. Among a handful of other scholars applying STS theories to disability (and vice versa), Brian Woods and Nick Watson collaborated on the historical sociology of the wheelchair beginning in 2001: . But the subfield seems to have gained traction in the last few years — you're not a latecomer!

Edit

1.  Mara Mills October 4, 2013 at 4:19 pm

   The missing link to the Woods/Watson project: http://www.york.ac.uk/res/iht/projects/l218252007.htm

   Edit

   1.  Amy Slaton October 9, 2013 at 6:46 pm

      Thinking about Mara's incredibly rich survey: Possibly here is one more way in which hist of tech/eng studies/disabilities studies might productively intersect, and perhaps bring criticality to ideas of individual capacity and self-efficacy that now pervade neo-liberal U.S. thinking on technical education, generally. (I'm drawing on field work I'm just starting in college-level engineering lab courses.) In studying the moments when engineering and science instructors accept and reject lab "adaptations" made for students with disabilities (and of course, the very framing of alteration as assistive, as Mara notes), we can expose power relations inherent in STEM epistemologies. For example, in one case, that which sighted students in a lab class generated (using an instrument's graphic read out) was seen by the instructor to constitute meaningful data; that which the student with sight limitations generated (using an audio readout supplied for the same instrument) was seen as providing only limited or corrupted findings…facticity deriving for the instructor/expert from representational form, just as science studies scholarship has led us to expect. But tracing that idea of "good data" also seems like it might be a way to interrogate technical rigor-as- social instrumentality, and also to remind ourselves that access and equity are only sloppily equated. Possibly fruitful?

      Edit

2.  James RiskOctober 11, 2013 at 3:57 am

   Mara,

   I worked in the disability community for several years at the West Virginia University Center for Excellence in Disabilities (WVUCED). I think this is an excellent opportunity for historians of technology. I am curious about why you choose to use a particular language in your piece when referring to individuals with disabilities. I wondered if I missed something. Some of the terms used, such as “handicapped” would not be popular within the community being studied.

   James

   Edit

   1.  Mara MillsOctober 12, 2013 at 12:23 am

      Agreed. I’m citing an article from 1980!

      Edit

   2.  James RiskOctober 16, 2013 at 8:03 pm

      Thanks for the reply and the clarification, Mara. That was not clear to me in listening to your presentation, but as I stated earlier, I might have missed something.

      Edit

2.  Paul EdwardsSeptember 30, 2013 at 3:51 pm

   Responding to Scott Knowles’ very thoughtful piece on disaster: this is **exactly** what we need more of at SHOT. Scott’s piece shows how we can derive useful patterns from our work as historians, and it shows how to make them relevant for larger audiences. Finally, Scott engages with conversations from urban geography and sociology, among others. Yes!!

   Somebody once told me that to get an op-ed published, the secret is to write 80% of it in advance and then wait for a “hook” to appear in the media. Then you write the first paragraph in the last paragraph, which has to be some kind of policy recommendation, and fire away.

Historians like Scott could do this very effectively – and so could others of us, if we were more aware of that possibility and ready for it when it happened. I like Scott's call for a press office, though I doubt the society can afford an actual office; maybe just bringing a media consultant to the meeting for a special session could do the trick.

Edit

3.  Gabrielle HechtOctober 2, 2013 at 10:33 am

This week in my graduate course on "Bodies, Technology, and Nature in Africa," we read an article that sits squarely between Bill Storey's post on the uncomfortable silences in the public history of South Africa's Kimberley diamond mine and Mara Mills's post on disability studies' critiques of STS. In it, historian and anthropologist Julie Livingston writes about former mineworkers in Botswana, the very men muted in Kimberley's museum display.

For over a century, hundreds and thousands of men traveled to work in the diamond and gold mines of South Africa. Mines gave workers who survived cash and status, but they also constituted a remarkably "efficient system for severing limbs and swelling brains and crushing spines." It was up to families to take care of the men who returned home with broken bodies. Yet as Livingston explains, notions of personhood in Botswana complicate a straightforward reading of these men as "disabled." Independence is prized in the US: it's advocated by US disability activists, and thought to be produced by (among other things) infrastructural and prosthetic technologies. But independence isn't celebrated in the same way in Botswana, where relationships – "webs of dependencies" – play a much larger, explicitly acknowledged role in defining personhood. An old man in a wheelchair being jostled down an unpaved road by his 10 year old grandson is not to be pitied: the wheelchair signifies privileged access to resources, and the boy displays the man's effective maintenance of personal relationships to support him in his old age. Together, the boy and the wheelchair index the man's life success, not his disability.

None of which is to deny the man's suffering, or the material challenges posed by flailing health and public sector infrastructures, or the transnational distribution of risk produced by capitalist labor practices in neoliberal settings (another roundtable theme). It's just that on the ground, these dynamics can intersect in unexpected ways. There are so many unpaved roads in this world that we, as historians of technology, have yet to explore.

Here's the reference: Julie Livingston, "Insights from an African history of Disability," Radical History Review 94 (Winter 2006): 11-26.

Edit

4.  Thomas KaiserfeldOctober 3, 2013 at 10:08 am

I totally agree that Scott Knowles report is indeed a very good case of how history can be relevant. It is a concrete answer to the crucial question stated in the preliminary report of the ad-hoc committee "What are the most productive and exciting directions for new historical

accounts of technology in our 21st Century intellectual environment?" I would like to take the opportunity to keep the focus on the word "historical". In my mind, this is a crucial notion less seldom discussed in more general terms in our community despite it being the subject rather than the complement in "history of technology".

Yes, the historical turn may be over, if there ever was one outside of literature. But I think the notion of us doing history as a specific practice in social science or the humanities, whichever is preferable, still needs to be brought up. What does it imply more generally and how can it be thought of as contributing to our colleagues working in other social and humanistic sciences most of all perhaps STS? This historians of technology's silence is in stark contrast to others such as historians of science who seem to be constantly debating the issue (Daston, Dear and Jasanoff for example).

Make no mistake. I am not trying to build disciplinary barriers or staking out a land of our own. No, I also have to confess to enjoy attending 4S- and EASST-meetings as well as reading the journals that these societies publish together with much else that come from other non-historical disciplines. But I also maintain a strong interest in history and work a lot with cultural as well as political and economic historians. In fact, my professional identity is that of the historian's more than anything else. And that is, I think, the reason I find it so strange that historians of technology so seldom discuss history in more principal terms and the problem of the past in relation to technology studies, at least less often than other contested categories such as technology, material, social, cultural etc.

I think there are many reasons for this reluctance to discuss for instance periodization problems or the problem as well as value of synthesizing studies that extend over longer time periods. One immediate reason is of course that the content of the multi-volume histories published for institutional reasons in the early years of SHOT are indeed discouraging to say the least. But I do not think long-term histories have to be written that way and I think there are more recent good examples to follow, for instance in history of science such as Jon Agar's "Science in the 20th century and beyond".

But taking history seriously also entails thinking about possible contributions to neighboring disciplines and beyond. Of course, many historians of technology simply do their thing and are praised for it more or less automatically by colleagues in other fields. What I am calling for is a more systematic discussion of what types of histories are relevant and how they can be framed. This question seems important for any community which wants to revitalize in a post-disciplinary environment, not in order to be anybody's servant but in order to raise the questions of the future of our community and its preferred relation to other communities.

A context of this my call for a discussion of the content of "history" is of course the rising demand for relevance that have been so much debated within humanities and social sciences all over the world for the past years. In my mind, historians of technology have been very successful in proving their relevance and many of us are directly active in a number of different policy forming organizations, national, international and global. Nevertheless, I think we should also take the time to think more systematically and principally about these issues and the relevance of time passed.

5.  Phil BrownOctober 6, 2013 at 2:41 pm

   N.B. Before I understood where to post replies I sent Scott the following private note re his piece here. I forward it for the group. I have long presumed a set of policy implications for historical study — and not just technology — and have been a bit surprised to see some of the comments posted here that suggest this really has not been broadly discussed within SHOT. With that as background, my comments are more focused on narrower issues.

   Best,

   Phil Brown

   –
   Just had a chance to look at your essay. As usual for you, it is an excellent summary of critical issues and themes. In one sense I have read it at an ideal time — in developing a common theme for area studies programs here around "water" I participated in a meeting in which a large number of engineers and scientists, three historians, and one or two social scientists participated. All volunteered possible comparative themes/issues: water purification, water supply, water as habitat, etc. Only one (just guess who) raised the issue of disaster in connection with water. Much of the science was not focused on disaster (just quotidian "problems") even if one thinks in terms of What was surprising in this group was the lack of social science participation (it may be that the sponsorship of area studies organizations scared them off — they don't think of area studies or humanities as having anything substantive to contribute) despite the potential policy implications of the theme(s). My reading is encouraging me to introduce an undergraduate and graduate readings course next year on this theme. It would be unique in the department.

   I could add some examples for comparison, but one point as a pre-modernist might be especially noteworthy. It is not just the legitimacy of modern state apparatus that is linked to handling of disasters. This is a major theme in the Chinese sense of a dynastic cycle — more disasters (including disease, pestilence, etc.) = loss of the Mandate of Heaven. One sees it in the expectation of government relief in famines in Tokugawa Japan. I'm sure there are lots of other examples.

   A second issue, perhaps bound up in the idea of "acceptable risk," is the possibility that expert statements of risk as such that they know what risks are involved, but they stop at standard, professional/expert statements that they think are revelatory but are not because the general public is not used to interpreting them. Public confusion over the meaning of "century floods" may be the best widely-known example.

   In part, isn't the focus on the response part of a disaster cycle really the result of problems we have in "imagining the unimaginable?"

   Edit

6.  Dolly JørgensenOctober 9, 2013 at 2:16 pm

I'd like to first comment on Knowles' piece, because what I felt was missing is what 'disaster' as a term means. He says that we are in the midst of two environmental disasters: 1. industrialization and its associated degradation and 2. frequent floods/hurricanes with high damage and loss of life caused by 'second nature'. What does it mean to be 'disasterous' if 'disaster' is the 'new normal'? In other words, is the same event that could have happened in the past really a 'disaster' if it happens now (or vice versa)? Perhaps what I'm missing is some historicizing of the concept.
Which brings me to my second item, which is a comment on Thomas Kaiserfeld's reply. I think he has nailed a really important issue that needs to be addressed. Both Knowles and Mills talk directly about STS. The problem I have with much STS scholarship as it is currently produced is that it is ahistorical. I've found that STS work often fails to put cases into their wider historical context — a case becomes something to prove that a universal theory holds true. As a historian, I find that approach lacking. So while using STS concepts certainly have value (after all I have a new edited volume out on bridging STS and environmental history), I worry that historians of technology will forget that they are historians.

Edit

7.  Scott KnowlesOctober 9, 2013 at 5:36 pm

Just a quick reply to Dolly Jorgensen's VERY welcome comments: I am entirely in agreement that much of the work to be done here involves showing what "disaster" means and has meant in different times and places. And there have been many, many conflicting and beautifully incongruous conceptualizations of disaster depending on when and where your historical lens is focused. This isn't of any surprise to historians (it's what we live for, right?)

In general today, in the west, a disaster is defined as a sudden onset event that badly disrupts normal societal functions and technological systems. This definition is heavily influenced by the traditions of disaster sociology and emergency management practice, which are in turn very much conditioned by methods focused on the present, near-past, and near-future.

As I try to argue, accepting this definition of disaster, and accepting the very commonly used dividing line of the "natural" and the "technological" has left us in a place where a disaster can easily be dismissed as an unwelcome visitation of malign nature or the malfunction of a technological system–divorced from deep history, and only answerable to the future insofar as the immediate mess is cleaned up and bodies buried.

So, I am always curious and also cautious about the deployment of the term in contemporary discourse–as I am of related "disaster language" like risk, accident, catastrophe, resilience, mitigation, vulnerability, and recovery. This language is politically situated, always.

To your really provocative question of what happens if we say we are "living in disaster"? Does the disaster concept (sudden, unexpected) cease to function–what replaces it? What are the political implications of saying that hurricane or counter-terrorism research and public policy/disaster relief should be treated the same way as long-term environmental pollution? What does this do to analysis of disasters across time and space? Merely by asking these

questions we see how invested our thought structures and public policies are in the distinction between “slow” disaster and “fast” (conventional) disaster.

I’m not sure exactly where it leaves us going forward–and I’m interested in historical cases where we might look for parallels. But my sense is that the more we show the historical contingency of these terms (and the experts that promote them) the more light we can shine on the irrational and unsustainable disaster politics of our time.

Edit

8.  Benjamin CohenOctober 9, 2013 at 8:10 pm

First off, as someone unable to attend the meeting this year, I find this forum/pre-game chatter useful and interesting. Second off, I wanted to follow-up on Jenny Smith’s entry to agree with and amplify her points. For me, it isn’t just that the history of technology and environmental history have productive overlaps in scholarship, methodology, and (often) audience. I think what’s also notable, and here’s where I second Jenny’s point, is that the history of technology’s materiality and environmental history’s materiality help show (a) that material studies themselves—looking into the thing-ness of the world—need to be approached from different and complementary perspectives and (b) that strategies from STS scholarship provide a useful means for doing so for both historians of technology and the environment. This may also go to Dolly’s point in the comment above, about keeping the history of technology historical instead of drifting into STS and losing the sense of historical context. I recognize that ahistoricity in a fair swath of the STS literature, but I don’t see it as much in the growing overlap of work (envirotech) that draws helpfully from and contributes to STS work. Nancy Langston and Etienne Benson’s examples are right on, as Jenny points out; so too are the cases explored in New Natures, the new book that Dolly, with Sara Pritchard and Finne Arne Jorgensen, put together.

Edit